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Including SOUTHERN AVIATION and AERONAUTICS

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Foreign Manufacturers Complete

by

MAX KARANT

Photographs from Pierre Marie

Leopoldoff L-3

Mauboussin "Hemiptere"

Farman "Mustico"

Focke-Wulf "Weihe"

NEVER content with just quality in aircraft, such European powers as France, England, Italy and even tiny Czechoslovakia continue to feature quantity in production; quantity in everything from tiny lightplanes to huge high-speed bombers and transports.

Several of these currently newsworthy aircraft as produced by the factories of the various nations are presented here. In the lightplane class there is the Leopoldoff L-3, the novel little Mauboussin single-seater monoplane, the Farman "Mustico" (all French machines) and the Czechoslovakian B.E. 60.

Then there is the ocean-going Loire 102 flying boat that will do trans-Atlantic duty for France. Patterned after the American Douglas DC-2, the Breguet 470 already has made its appearance on Air France, the national French airline. In the trainer category there's the French Morane 350 advanced trainer. For sportsman pilots France's Caudron company has produced the "Fregate," technically known as the C-480.

Another French manufacturer—Potez—has turned out a high-performance biplane, the Potez 50, one of which the famed French airwoman, Maryse Hilsz, flew recently to a new women's world altitude record.

War planes, however, always are predominant in European aircraft manufacturing circles. Again referring to France, the Dewoitine company has turned out a deadly fighter powered with the Hispano-Suiza cannon engine. Italy, meanwhile, learning many things from her recent Ethiopian campaign, has taken to the development of efficient long-range bombers. Now on order is a large batch of Savoia-Marchetti S-72 tri-motored bombers.

Focke-Wulf, another famous European manufacturer, also has turned out three mentionable types: the F-44, aerobatic trainer; the F-56, pursuit trainer; and the F-58, reconnaissance-bomber.

LEOPOLDOFF L-3

Powered with a 40 h.p. Salmson engine, this machine has a rated top speed of 80 m.p.h. and a landing speed of 30 m.p.h. Range is 350 miles and the ship's service ceiling is 15,000 feet.

The L-3 is made entirely of wood. The fuselage is covered with plywood and the wings are fabric-covered. The upper wing has a span of 29 feet while the lower wing measures 21 feet. The ship is 7 feet high and 20 feet from propeller to tail.

Several New Aircraft Designs

Empty, the ship weighs 540 lbs. and has a useful load of 420 lbs.

MAUBOUSSIN

Known as the "Hemiptere", this novel little airplane is attracting much attention in French sport-flying circles. Built by M. Pierre Mauboussin, the little monoplane is a somewhat radical departure from the ordinary lightplane. The tail surfaces serve as almost a second wing; the main wing's span is 22 feet 11½ inches, while the horizontal surface of the tail measures 14 feet 2½ inches.

A single-seater, the "Hemiptere" is powered with a 40 hp. Train four-cylinder inverted in-line air-cooled engine that gives the ship a top speed of 99.36 m.p.h., a cruising speed of 83.8 m.p.h., and a landing speed of 27.9 m.p.h. Service ceiling is 12,464 feet and it has a four-hour range (335 miles).

Flaps on the forward wing are interconnected with the elevators on the rear surface and operate automatically.

FARMAN "MUSTICO"

Another of France's latest lightplanes, this little midwing monoplane is powered with a 25 h.p. four-cylinder Ava engine which gives it a top speed of 80 m.p.h. and a cruising speed of 70 m.p.h. The ship's range with a full load (550 lbs.) is 220 miles.

The "Mustico's" general specifications give it a wing span of 26 feet, an overall length of 10 feet 6 inches, and 6 feet 3 inches high. Empty, the ship weighs 310 lbs.

BENES-MRAZ B.E. 60

Resembling somewhat several American lightplanes, this ship compares favorably in performance with the American products. Powered with the 45-50 h.p. Walter "Mikron" engine, the B.E. 60 has a rated top speed of 93 m.p.h. and a cruising speed of 77.6 m.p.h. Landing speed is 34 m.p.h.

A novel feature of the B.E. 60 is the fact that it is a folding wing ship and can easily fit into an ordinary automobile garage. Built entirely of wood, plywood and fabric, this ship will accommodate two people, side by side and with dual controls.

Span is 36 feet 8¾ inches, the ship is 21 feet 8½ inches long and stands 5 feet 9 inches high.

LOIRE 102

Designed primarily for long non-stop ocean flights, this ship has a cruising range of slightly more than 2,000 miles at a cruising speed of 155 m.p.h. at 55 per cent throttle. The French Air Ministry purchased this boat and a Loire-Olivier 47 for commercial tests on the north Atlantic.

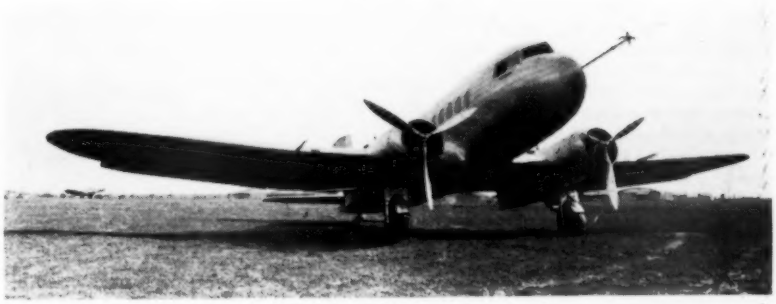
Powered with four 720 h.p. Hispano-Suiza engines, the Loire 120 will not carry passengers and is built only to accommodate the crew. The ship's span is 111 feet 6 inches and stands 22 feet 9 inches high. Fully loaded, the Loire weighs 40,700 lbs.

BREGUET "FULGUR"

Known officially as the 470-T, this

Benes-Mraz B.E. 60.

Loire 102



Breguet "Fulgur".

Morane 350

14-passenger monoplane has a striking similarity to the American Douglas DC-2. Designed primarily for Air France, the national French airline, the "Fulgur" is powered with two 820 h.p. Gnome-Rhone 14-cylinder engines that give the machine a top speed at 6,550 feet of 239 m.p.h. Cruising speed is said to be 211 m.p.h. at the same altitude. The ship's range, however, is listed at 560 miles as compared to the DC-2's standard range of 1,085 miles.

The "Fulgur" measures 67 feet 3 inches from wing tip to wing tip, is 51 feet long and stands 21 feet high. Like the Douglas, the Breguet transport is all metal.

MORANE 350

Michel Detroyat, famed French speed pilot, uses this comparatively new model for his aerobatic demonstrations at the various air shows around his country.

Powered with a Renault 220-240 h.p. air cooled in-line engine, the Morane 350 was designed as an advanced training airplane. It was designed particularly for the strains of advanced aerobatics and therefore is admirably suited for this type of work. The ship also is stressed to take the new Salmson 250-310 h.p. radial engine.

The new Morane's span is 27 feet 4 inches. The machine is 20 feet long and stands 7 feet 9 inches high.

CAUDRON C-480

A smaller development of the old Caudron "Phalene", the "Fregate" is a three-place cabin monoplane not unlike England's De Havilland Puss Moth.

Top speed is 130.4 m.p.h., cruising speed is 115 m.p.h. and landing speed is 46.5 m.p.h. The ship is powered with a four cylinder air cooled in-line Renault "Bengali" engine of 140 h.p.

The span is 39 feet, length is 26 feet 11 inches and height is 6 feet 11½ inches.

POTEZ 50

This is the machine in which Mlle. Maryse Hilsz, famed French aviatrix, set a women's altitude record of 46,948.725 feet June 23, 1936. It is this machine which Georges Detre is expected to attempt to better the present altitude record in the plane's category, 49,944.121 feet.

The Potez-50 is powered with a 900 h.p. Gnome-Rhone radial engine. Other details concerning this ship are not known at this writing.

DEWOITINE D-513

Military aircraft continue to pour out of the factories of the world. Almost daily there is something new in the world of military planes. Much interest always is directed toward fighting planes; those tiny high speed pursuit ships whose performance charts would make a World War fighting pilot gasp.

Another comparatively recent addition to France's fighting squadrons is the Dewoitine D-513, a low-wing monoplane fighter powered with the deadly 860 h.p. Hispano-Suiza cannon engine. In addition to the cannon, the pilot of this new fighter also has four machine guns' firing levers at his finger tips.

Estimated top speed of the D-513 is 298 m.p.h. at 15,910 feet. According to the manufacturers, the ship has a ceiling of 37,390 feet and can climb to 13,210 feet in 5 minutes 6 seconds.

(*Concluded on page 60*)

New French Aircraft Are Outstanding

Caudron "Fregate".

Potez 50.

Dewoitine D-513.

Focke-Wulf FW-44

Chinese Aviation Comes of Age

by KURT RAND

With the recent arrival in Hong Kong of the *Hong Kong Clipper* from the United States, the final link in an international aerial network that has China as a main crossroad has been welded.

AVIATION "trusts" have been trying mightily for years to gain a firm foothold in a country that today is one of the world's most promising laboratories for civil aviation: China.

So far just two foreign nations have been able to set up commercial aviation systems in China; the United States and Germany. These countries operate one each of the three Chinese airlines. The third line (South Western Aviation Corp.) is strictly a Chinese project with Chinese pilots flying American aircraft over the system.

Unquestionably, the greatest outside force in developing Chinese commercial aviation is the United States. American enterprise has built up an airline in that country that compares quite favorably with any modern American airline.

The American company in China is the China National Aviation Corp. in which Pan American Airways System holds 45 per cent of the capital. Hence, Pan American developments and efficient operations procedures have been passed on to the Chinese line until today it is as modern and well-run as any airline of its type in the world.

C.N.A.C. gained an unbeatable "scoop" over other aviation interests in China recently with the completion of the final link in Pan American's trans-Pacific airline between San Francisco, Hawaii, Manila and Hong Kong. The arrival of the *Hong Kong Clipper* on the mainland officially completed the chain in probably the greatest aeronautical enterprise of the past decade. . . .

Hong Kong harbor and the twilight of an historical evening greet the arrival of Pan American Airways' *Hong Kong Clipper*. No passengers were carried on this first complete scheduled flight from San Francisco to China proper; first flight covers for air mail stamp and cachet collectors, however, totaled 43,865

American pilots who get "tired of it all" in the comparatively drab routine flying in this country usually think first of heading for China. A few have been side-tracked to other corners of the earth; many, however, have been lured by China. Hence today American pilots operate the Douglas DC-2s on C.N.A.C. routes between Macao, Hong Kong, Shanghai, Peiping and Nanking. Co-pilots are Chinese.

Not only are American pilots flying Chinese airlines but they are serving in many other aeronautical capacities. American pilots have received world-wide publicity by flying in the Chinese air force. American pilots are rated among the best of China's instructors and the majority of Chinese aviation schools today boast American talent. American aircraft largely dominate Chinese aeronautics.

Pan American's "rival" in China is the German-controlled Eurasia Aviation Corp. which operates its Junkers transports between Shanghai, Lanchow, Paotow, Peiping and Sianfu. German pilots do the flying. But even then the American influence enters the picture for many of the German planes are equipped with American engines and propellors.

Commercial aviation operations in China, however, usually are overshadowed by military aeronautics. The Chinese are just as progressive in this branch of flying as they are in airline establishment and operations. Again, American equipment makes up the majority of China's military aircraft forces. Recently, 10 Boeing P-26A monoplane fighters were delivered to the Cantonese air force. Chinese war lords have consistently bought and flown American aircraft. One notable example of this is the Boeing 247D transport similar to that used on several American airlines which is the airplane of Marshal Chang Hsueh Liang. This war lord even hired an American pilot to fly the ship for him.

Probably the greatest detriment to the development of Chinese aviation is the fact that the country is so split up internally. Airline operators are strictly "on their own". There are at least two air forces; in name, if nothing else. This lack of unity, then, has chiefly been responsible for the lack of initiative on the part of the Chinese people and government (or governments) in developing Chinese aeronautics.

Many ventures, most of them unsuccessful, have been made in Chinese commercial aeronautics.

Until the stock market crashed and the Depression of a few years ago, the Curtiss-Wright Corp. played a prominent part in aviation in China. Not only did the Curtiss company sell the various Chinese military groups war planes, but the same company operated the "flying service" that preceded Pan American's airline as it stands today. However, with the decision of the Curtiss firm to abandon much of its activities in China the Pan American company entered into an agreement with the Chinese government to establish the present China National Aviation Corp.

Today China's commercial aeronautics are slowly expanding and becoming more permanent. Not only are airline connections now available between China, the Philippines and the United States, but connecting airlines enter China from Europe, Asia, Australia and Japan.

China's civil aeronautics today are at a peak. While in some nations aviation

Airlines in China are few but far-reaching.

had hit peaks between 1930 and 1937, Chinese aeronautics in 1930 were practically nil. During that year American and British aeronautical interests had shipped in many airplanes, all of them intended for commercial use. But the various war lords soon ended that by seizing the ships and using them for military purposes. An attempt was made by an American company in 1929 to operate an air mail route between Canton and Nanking but the war lords and bandits made such operations both irregular and dangerous.

Three years between 1930 and 1933, however, showed a gradual rise in interest in civil aeronautics in China. In 1933 there were two airlines (C. N. A. C. and Eurasia) in operation, although operations were quite irregular because of the dangerous territory over which they operated. Despite these hazards, however, C. N. A. C. in 1933 had managed to set up and maintain China's first chain of airway radio stations and a meteorological service. Meanwhile, the Germans had begun to establish themselves and, in conjunction with Chinese interests, started operations on the Eurasia line. When Pan American Airways took over the American interest in C. N. A. C. that same year, plans were laid that just today are being fulfilled to completion.

By 1935, however, the basic setup of China's present commercial airlines was permanently established with the three lines, C. N. A. C., Eurasia and South Western Aviation Corp., in full operation.

The casual observer would say this Douglas airliner was over New York, Boston, Seattle or San Francisco; anywhere, in fact, other than Shanghai. Yes, that's modern Shanghai below.

Here's A Real Pilot!

THERE'S an airline pilot flying today who has something of a breath-taking record. Just the other day he recorded Flying Hour No. 17,500. . . .

To look at the figure 17,500 leaves the casual impression that that pilot has done a lot of flying. But just how much said pilot has done in actual working days is something else again. So let's break down that 17,500 hour mark.

If a man flew an airplane eight hours a day, to equal 17,500 hours, he would have to fly every day—Saturdays, Sundays, holidays, rain or shine—for five and nine-tenths years. Five and nine-tenths years or 2,187½ days of steady flying, eight hours daily!

Now say that pilot averaged 125 m.p h. —which is conservative — throughout those five and nine-tenths years. At the rate he now has flown roughly 2,250,000 miles—the equivalent of 9,000 times around the world at the equator!

In other words, Pilot James H. Knight really has been places. Farmers and city folks along United Airlines' Chicago-Omaha division, however, know him as Jack Knight, the pilot who has flown everything from flimsy mail planes to giant airliners over that division since 1927.

An 8-Cylinder Model Engine

AFTER two years' work in his spare time, Edmund A. Freund of Iowa City, Ia., has announced the results of preliminary tests on his novel eight-cylinder radial gasoline engine for model airplanes.

Entirely hand built in his own model aircraft shop, the Freund engine is a two-cycle engine of excellent performance. A query from POPULAR AVIATION brought this reply from Mr. Freund:

"My engine starts instantly in cold weather, has very few working parts (there are no gears, valves, camshafts, pushrods or oil pumps) and runs very smoothly, thereby reducing strain on the crankshaft and crankcase and causing remarkably little wear after having been run 15 hours.

"The bore is 1¼ in. and the stroke is 1⅜ in. Aluminum is used throughout and the cylinders have steel sleeves. The engine is supercharged and runs very smoothly, for the crankshaft has eight power strokes per revolution. Only working parts are the pistons, rods, crankshaft, supercharger and breaker points.

"Tests show that my engine will idle at 300 r.p.m. and run 1,500 r.p.m. wide open. As to further wear, I expect to run it 500 to 1,000 hours this summer to check this. Tests also will be made within a few weeks to determine the horsepower, fuel consumption, cylinder temperature, etc. At present the engine swings a 30 in. aluminum propeller of medium pitch.

"I made all the patterns and most of the aluminum castings. At present I plan to build a similar engine of about 50 h.p. for Taylor Cubs and similar lightplanes."

They Crash Their Way To Fame

by WILLIAM J. BOYLHART, JR.

Pick your favorite airplane crackup, tell these boys what you want and, if you can afford it, they will give you the most finished job of eliminating one airplane that money can buy. Hollywood's a swell but coldly exacting customer.

THE roaring crescendo of a racing motor shrieked from the heavens; upon the earth three motion picture cameras ground out their film. A fleeting shadow passed over the small pile of hay . . . this was to be the spot where the plane was to crash.

Circling, the small scout headed back toward the cameras; at four hundred feet altitude the ship sped directly at them. Its dive became steeper; the flying wires protested against the undue stress and their high pitched whine rivaled even the thunderous vibrations of the wide open motor.

Three hundred yards away, the spot seemed to be moving toward the diving machine. The pilot's head appeared over the side of the cockpit as he gauged his distance. Suddenly he raised his right arm and tore his goggles off; hurled them from the plane. They sped, twisting over and over, toward the ever nearer ground. There was to be no chance of splintering glass.

The pilot's alert eyes glanced toward the instrument panel. Hovering between one hundred and one hundred and five miles per hour, the airspeed indicator vibrated in fury. One hundred feet away lay the spot. He had to hit it, he couldn't miss now!

The grip on the control stick tightened as the pilot braced himself for the impact. The stick moved ever so slightly and the left wing tip dug into the earth. Like a mad creature the biplane spun upon its wing, raising huge clouds of dust! The left wings cracked with an unearthly crash. Traveling along the ground upon its back, the wreckage of what had been an airplane finally came to rest. The debris settled and slowly the air cleared; the cameras ceased their work.

Howard Hughes was determined to get authentic equipment when he made *Hell's Angels* several years ago. Hence, the above ship is an honest-to-goodness Fokker D-7 that actually flew in the World War. Note the wooden camera mount built around the fuselage near the tail. An automatic camera mounted behind the pilot's head (also note camera release wire running from the camera to the underside of the cockpit) filmed a dogfight in which the Fokker took part.

A group of men with fire extinguishers and tools ran toward the wreck . . . perhaps the pilot was caught in the wreckage, and if a spark should happen to fly with all the gasoline lying in the dust and upon the shredded fabric wings . . .

But the smiling pilot dropped from the inverted cockpit. He glanced toward the rear of the plane, and with satisfaction noted that the small pile of hay lay directly under the plane's tail assembly.

Not so authentic is this "wartime" shot. The picture is supposed to show a German plane strafing an Allied field. Hollywood technicians slipped, though, for the attacking plane is a comparatively modern Fairchild KR-21 trainer.

He had fulfilled his part of the contract—he was satisfied and the $500 he had received was good pay, despite the risk, in his estimation.

It was only several years after the World War that the aeronautical stunt man appeared at the motion picture studios. Along with the early 1920 motion pictures came various ex-war flyers and barnstorming pilots who saw that there was more money to be made in motion picture flying than in carrying passengers, in a decrepit war relic, at five dollars each.

One of the earliest of these and, undoubtedly the foremost, was a young fellow, just back from the war, named Dick Grace. Before the war Grace had been a law student, but flying had gotten into his blood and there was no other life for him. It was he who got the motion picture studios to take up the production of war-flying pictures. And, to this purpose he risked his neck innumerable times. It may well be said that Dick Grace established his own business, for once the studios started to produce aviation thrillers, he was in high demand . . . and in time became a specialist in his particular line of endeavour.

As a general rule, in all the wartime aviation pictures actual wartime aircraft were used. This constituted an additional hazard, for the construction of these machines was not too strong and time had weakened them further. It

was necessary to rebuild every wartime ship that was used in the movies.

Even the aircraft constructed of steel tubing had to be strengthened, for there were several complaints on this score when two wartime machines folded up in the air despite their presumably strong steel construction. It is exceedingly doubtful that the original pilots made the complaints after their drop to the earth from 3,000 feet.

The plane to be used in a crash must be carefully prepared for its work. The fuselage must be strengthened with steel tubing and all wooden longerons are wound with tape to prevent them from splintering. Wires are attached to the landing gear so that it does not crash through the cockpit flooring and crush the pilot's legs.

All instruments are carefully padded with thick pads of horsehair. Longerons and braces in the cockpit are heavily padded. The instrument panel is padded more thickly than any other part, for there is a chance that the pilot's head may lunge forward and crash into the panel, with disastrous results.

An idea which has been suggested time and again by onlookers at movie crash scenes is, "Why doesn't the pilot have a steel suit made, such as the armored suits the knights of the Middle Ages wore?" At first glance this may appear as practicable; for a time it did to Dick Grace. The suit would certainly prevent splinters and jagged pieces of debris from piercing the body of the pilot. Grace actually went so far as to have one constructed.

But, it was so bulky and heavy that he never used it. In addition he could clearly see that should the suit become severely dented, or should he be pierced by a metal tube it would be almost impossible for the suit to be removed so he could receive medical attention. Also, should he be caught in the wreckage and it should catch afire there would be no chance of rescue.

As the studios reproduced more and more of the War in motion pictures, they sought to outdo each other and their productions became larger and more costly. One of these large scale productions was "Wings", which was produced in 1926, at a cost of $2,500,000. Dick Grace was called upon to provide four crashes for this picture. The first three were just ordinary crashes and provided little trouble, but the fourth had Grace worried.

The machine to be used was a wartime Fokker D-7. However, the original motor had been removed and a heavy L-6 type motor installed. This two hundred horsepower motor made the nose of the machine very heavy, for the plane was not designed to mount such a heavy motor. Therefore it would be necessary to crash the ship at a very high rate of speed in order to maintain full control and keep the nose of the Fokker at the correct angle.

Incidentally, every crash which Dick Grace contracted for had to be different and distinctive from any other which he had made for the same picture. He had to set the plane up in one certain position, which had been agreed upon beforehand. In one case, he would have to crash and end up with the plane lying on its side, in another, the plane would have to be standing on its nose . . . these were not just "crashes".

It took real skill to crash a plane at 100 miles per hour and have the machine finish standing upright upon its nose, for, if after being in that position the machine fell over upon its back the scene was a failure and would have to be done again, and there would be no payment for that crash. It can easily be seen that there is more to crashing a plane for the movies than luck.

As the time neared for the last crash of "Wings", Grace had a strange premonition that some harm would come to him in this crash. Perhaps Fortune was not smiling upon him this time, perhaps that heavy motor would prove his undoing. Perhaps . . . but it would do no good to worry about it, it was too late now to make a change in his plans. Night after night he visioned that crash in his dreams. He saw himself lying in the wreckage, he did not move, did not walk away from that crash, he saw the doctors; and then he would awaken with a cold sweat upon his brow.

The final day arrived, a beautiful day, with large billowy clouds to form a background for the scene. The Fokker stood on the line, its motor ticking over. Grace climbed into the cockpit. He adjusted himself in the seat, his mechanics tightening the heavy web belts. Gradually he eased the throttle forward and the low tone of the powerful motor increased to a throaty roar, as the ship tugged at its wheel blocks. Many thoughts must have run through the pilot's mind as he waved the wheel blocks away.

The Fokker taxied into the wind and the plane sped swiftly along the ground and into the air. The doomed ship and its master, who was to destroy it, soared upward. Below lay the earth with its insignificant mites . . . but the pilot had no thoughts for them. Passing once over the spot and banking around he was diving in for the crash.

Now, the cameras upon the ground started their work. A pair of goggles disappeared over the side of the cockpit; the pilot gauged his distance. A swift glance at the dashboard . . . one hundred and ten miles an hour . . . he had never crashed at such a speed before! The spot came up at him; he leaned hard against the belts to lessen the impact.

With a terrific crash the ship struck upon its nose and dug into the earth. Everything went black . . .

When Dick Grace regained consciousness he was standing before the battery of cameras. "Why, you crawled from the wreckage by yourself", they answered his query. He must have fainted after having crawled from the wreckage.

After the mechanics had examined the cockpit of the crashed ship they noticed that the pilot's head had completely smashed the padding and fittings of everything in front of the pilot's seat.

(Continued on page 68)

Boeing's New Clipper

C. N. Monteith, Boeing vice-president (left), and R. O. Bullwinkel, Pan American Airways official, discuss a model of the forthcoming Pan American clippers.

FIFTY tons of airplane carrying 72 passengers and 8 crew members flying the oceans at 200 miles an hour through the efforts of 6,000 horsepower sounds like some sort of wild aeronautical pipe-dream. But let POPULAR AVIATION readers be assured that this is no longer wild nor is it a dream.

The above photograph is the first concrete proof of the authenticity of such a future for American aeronautics. In other words, the above photograph is a pre-pre-preview of the new giant four-engined Boeing trans-oceanic super-clippers now being developed for Pan American Airways.

Much of the details of the new Boeing are strict secrets. However, it is known that there will be three decks: the flight deck, the main deck and the hold. On the flight deck will be posts for six flying officers. The main deck will contain the passengers' quarters and, in addition to regular cabins, there will be private staterooms, a dining and lounge cabin and the galley.

As to performance, all that Pan American engineers will say is that the newly-developed Wright engines of 1,500 horsepower each will give the ship a 200-mile an hour top speed. In addition, the ship will carry 5,000 gallons of gasoline which will give the giant liner the almost unheard of cruising range of 5,000 miles.

Pan American officials say the first of these ships will be flying by this fall.

Meanwhile, other Boeing designs already under way include a high-altitude four-engined transport and two models of four-engined army bombers. The stratosphere transport is being built on an order from Transcontinental and Western Air, Inc., while the bombers both are Army Air Corps projects.

END

An Aviation Writer Reminisces

by JAMES FARBER

Aviation reporters (sometimes they're called "editors") usually lead quite a colorful and interesting life. The majority of the things they know about famed persons rarely get into print. This is one of those rare times, however.

ROSCOE TURNER, in the full glory of his uniform—and curling mustache—stood there and glared at me. He was sweating like a lion. I glared back. I was sweating like a lion, too. The play of lightning was terrific. There were two Klieg lights trying to melt us.

Roscoe held a copy of POPULAR AVIATION in his hand. We were being photographed. Roscoe reads P. A. We were to use the photo—and did, later—in the magazine. The glare was the fixed stare of a posed picture. It was, of course, accompanied by a broad parting of the lips in what purported to be a smile.

After the picture, Roscoe and I had a good laugh.

And Roscoe is a good one to get started on in a "general confession" story of an aviation reporter. I'll begin by admitting that my greatest pre-disposition toward Roscoe Turner is the fact that we are a good deal the same size and weight and maybe there's a subtle psychological factor therein that makes him so easily amenable to my nose for news when I need copy.

Most men, such as your reporter, who must needs have their clothing draped about them as though an elephant were being outfitted, are hugely handicapped, all theories to the contrary. We get stoop-shouldered bending down to hear what the other fellow has to say about himself and we get callouses on our shoulders trying to squeeze into cockpits and other places that God probably never intended us to enter.

The only time a reporter of gargantuan girth feels at home in an interview is when he is sitting down with his subject. O, to be a dapper chap! O, for the joy of walking into a ready-made clothing shop and walking out perfectly fitted! O, for the pleasure of sliding into an open-place ship with a parachute slapping the back of the lap and have some room left over without getting feet, arms and clothing tangled up in levers and wires and mechanical protrusions.

Thus, it may be seen that some of the commoner of life's complaints are shared even by aviation reporters in their pursuit of never-ending glamorous yarns.

Major Albert W. Stevens (left) is much more widely known than is his able pilot, Capt. St. Clair Streett (right). Together, however, these men have made aeronautical history.

Lieut.-Col. H. A. Dargue (center) is sure all newspaper reporters are "cussing devils". In some cases he's right.

In a lump sum, then, it may as well be admitted by this reporter that his so-called aerial adventures have taken him through the gamut of sensations: joys, sorrows, enthusiasms, humiliations, embarrassments, thrills, delights, panics, discomforts and—being just downright scared.

I think the time I took off with Col. Dean Lamb from Curtiss field proved to be the most humiliating of them all. We climbed to a thousand feet then headed for the glistening spires of Manhattan en route to Baltimore. The engine began to lose one of its cylinders. Dean looked back, fixed me with his eye, announced that my weight was too much for our modest cabin job and flew back to Curtiss. He showered me with dust as he took off again—while I stood bewildered, angry, annoyed, embarrassed and humiliated in the center of the field where I had been unceremoniously "dumped."

My hunches are rarely any good but like most reporters, I am full of them. One time on a long crosscountry hop to New York with Capt. "Fritz" Phillips of the Air Corps, I had a terrific hunch that "something" was going to "happen" on this trip. I thought the best thing I could do would be to read humorous magazines and at least get my mind off the "premonition." Each of the papers contained more cartoons of crashing and falling airplanes than I believe I ever saw before. To me it was the height of grisly humor. I threw the magazine overboard long before we hit the Pennsylvania mountains. We then ran into a hail storm. I was sure my face was in

ribbons and that the end was near any minute. We ploughed through some stiff headwinds and my shivering knees kept time with the tattoo of the shaking struts. Over Manhattan Fritz elected to chase a dirigible around the island, taking a dip over the Battery and the Statue of Liberty. I was wishing I had as much liberty right then as that statue had.

There was no reason for the hunch. I didn't have it on the return trip. All went well. I had forgotten all about it.

Was my face red over Cincinnati one bright day! We were in one of the Army's 14,000-pound bombers, circling around for a test broadcast. I had a mike glued to my lips. Talked as fast as possible and at random. Wisecracked

Col. Roscoe Turner reads P.A. too.

with the ground engineers. They kept asking for more. "It's coming in better and better," they said. I kept talking.

That went on for half an hour. At the end, the announcer told I don't know how many listeners that this broadcast was entirely impromptu—that even the "flying reporter" didn't know he was "on the air as well as in it." With my proficiency in the art of anathema, I do not know this day what impelled me to forget some of my saltier editorial room expressions—inasmuch as I didn't know we were talking over a chain of radio stations!

Colonel Harry A. Dargue, at the bomber's controls, said afterward it was tl e first time he ever heard a newspaperman talk that long without a cussword.

I think this reporter's greatest delight was discovering that Orville Wright is one of the pleasantest celebrities to interview he has ever tackled. Occasion was an assignment from POPULAR AVIATION as

(*Continued on page 64*)

Our Front Cover, The North American O-47

This ship probably will replace many obSolete National Guard planes throughout the country.

NORTH AMERICAN AVIATION CORP. is believed to be the first aircraft manufacturer to produce a military airplane in which elaborate pains have been taken to meet the specific requirements of an observer. This ship, the North American O-47, is shown both on the front cover and in the model aircraft section. . . .

The O-47 is a three-place midwing monoplane, is all metal and powered with an 850 h.p. Wright "Cyclone" engine. The special observers' accommodations include an open "station" in the bottom rear of the cockpit through which guns or cameras can be used. The newly designed retractable landing gear contributes materially to the ship's maximum speed which is said to be approximately 238 m.p.h.

This ship is one of a long line of military craft now being turned out by the North American company. This firm dates back to the old Fokker Aircraft Corp. that once built commercial aircraft at Teterboro, N. J. When Anthony H. G. Fokker decided to leave American aircraft manufacturing and concentrate on foreign production (in Holland) the American company became known as the General Aviation Manufacturing Company. When North American Aviation, Inc., was reorganized in 1934, it became an operating company of two divisions. The operating division is Eastern Airlines. North American's manufacturing division goes under the parent company's name. Factories are maintained at Los Angeles and Dundalk, Md., former home of B/J aircraft.

With the adoption of North American's latest observation ship, National Guard aviation units throughout the United States practically are assured of modern equipment to replace well-worn observation ships in the near future.

The Illinois National Guard unit, for instance (it's part of the 33rd Division) has been using open-cockpit Douglas O-38s for many years. These Douglases have given long and rugged service but have become antedated so far as efficient observation aviation has been concerned recently.

Where the Douglases are open and cramped both for pilot and observer, the new North Americans remedy all this. The O-47 gives both pilot, gunner and observer (three men to an observation plane now instead of the traditional two) ample room, protection from wind and weather and other comforts hitherto unknown in military aircraft.

This new equipment will be consigned to National Guard units in the near future. At present there are 19 National Guard units in the United States, each of which is equipped with eight standard observation aircraft. For each of the 18 infantry divisions in the U. S. Army there is one observation squadron and one photo section.

This photograph was made at Wright Field, Dayton, O., where the Air Corps put the O-47 through successful acceptance tests.

He Built the "China Clipper"

by JACK ROBINSON

One of aviation's earliest but most successful airplane manufacturers is Glenn L. Martin. Twin-engined Army Air Corps bombers carry the Martin name throughout the nation. Four-engined Pan American Clippers carry the name to the Orient and South America.

WHEN the *China Clipper* blazed its epoch making trail across the Pacific it was a fitting tribute to its builder, Glenn L. Martin.

Impressive though it was, it is only another item to be added to this man's inspiring list of aeronautical achievements. His career, which finds its counterpart in Horatio Alger's "rags-to-riches" fiction, has been almost a continuous succession of historic flying "firsts".

To begin at the beginning, Glenn L. Martin was born in 1886 at Macksburg, Iowa. At an early age he evinced an interest in flying kites. Had his boyhood arrived at a later date, he might have built model airplanes, but at that time the Wright brothers had not shown the world what an airplane would even look like, so young Martin satisfied his yen for things aeronautical by building kites and flying them.

His kites were of such superior design and construction that they outflew all those of his friends. As a consequence, he was promptly besieged with orders for kites from the Martin workbench.

At this point in his career there came to the surface the characteristic to which most of his success has been attributed —that of figuring everything out on paper before acting. He drew complete working plans for his kites together with a careful estimate of materials budgeted down to the last inch of string. Thus, he figured he could make a profit on his kites by charging twenty-five cents each.

After graduating from Kansas Wesleyan University in 1906, he moved to Santa Ana, California, where his father was in the hardware business.

Casting about for a vocation, young Martin decided to launch into the then young automobile industry. To do this he would have to build a garage. To build a garage would require money and money at that time was a commodity not to be found in his pocket-book. There was the age-old problem.

Two famous aeronautical figures. One is a model of the famed "China Clipper"; the other is Glenn L. Martin.

The 20-year-old boy tackled it with characteristic resourcefulness. He picked up his pencil, mapped out on paper just what it would cost him to open the garage, made an estimate of profits, and took the figures to a local banker who was so favorably impressed that he loaned him $800 without security. It can truthfully be said that Glenn L. Martin "started from scratch."

From the first, the Martin garage was a success. Records show that he sold approximately 40 automobiles annually, which was quite a record, taking into consideration the fact that it was before the days of mass-production and popular prices.

Motors intrigued the boy's scientific mind. There in his garage, as a mechanic, he became an expert on gasoline motors, mastering every nut and bolt. The practical knowledge thus acquired was the foundation for his future aeronautical success.

During the days Martin was establishing his garage, the Wright brothers were setting the world agog with their first airplane flights. These flights inspired young Martin with a burning ambition to build a plane of his own and fly it. First he experimented with gliders until he perfected a wing with sufficient lifting power to carry a motor as well as a pilot.

Next, he prepared a budget to show him how much money he could spare from his auto business with which to build an airplane—the old business instinct asserting itself again. Satisfied that he had enough financial resources for the undertaking, he rented an old abandoned church for twelve dollars a month and began bringing odds and ends from his garage with which to build his first airplane.

He nailed boards over the battered church windows to discourage curiosity

Like practically all famous airmen today, Glenn Martin got his start with contraptions like this. He built this himself and flew it successfully.

seekers who already had branded him as "something of a nut." Strange to say, his mother was practically the only other human being who felt he was justified in deciding to devote his life to crazy aviation. She tirelessly held a lamp for him as night after night he hammered and wired and sewed the materials together to form a rather weird looking flying machine of the pusher type.

For power he installed an old converted Model "T" Ford automobile engine which coughed up some fourteen horsepower. (So we see Martin was the first to use a Model "T" Ford in an airplane.)

Finally, one day in 1909, a small crowd in a field near Santa Ana, California, watched a tall, bespectacled youth quietly make adjustments to an airplane. The young fellow didn't really look like a daredevil. His high forehead, glasses, and modest, unassuming manner suggested the college professor.

Nevertheless, after he got the noisy Model "T" engine warmed up sufficiently he climbed into the pilot's perch, gunned the motor, and with a wave, bounced off. The weird looking craft sailed through the air at a speed of about forty miles an hour for a distance of fifteen hundred feet before coming to earth again.

Thus, Glenn L. Martin at the tender age of twenty-two became the third man in the United States to build and fly an airplane of his own invention.

From 1909 to 1912 he confined his efforts to exhibition flying and air racing. For racing he built another pusher and installed a fifty horsepower Hall-Scott motor which stepped his top speed up to about sixty miles an hour. On May 10, 1912, he won the world's distance record for hydro-airplanes by flying sixty-eight miles. On May 20, he broke the world's seaplane altitude record by climbing to 5,200 feet—just short of one mile by 80 feet.

During the same year he moved to Los Angeles and built a factory for the manufacture of exhibition planes, using money he had won as an exhibition flyer himself. An idea of his earnings at this game is gleaned from the fact that he won $6,000 in 1913 by placing first in the Grand Derby at Chicago.

The year 1913 was a banner year for the young manufacturer aside from his winning $6,000. He sold two training planes to the U. S. government. He designed and built a biplane hydro-airplane powered by an eighty horsepower Curtiss motor which won him the distinction of being the first American pilot to carry three passengers.

A plane built by him and flown by Didier Masson, French soldier of fortune, was the first flying machine to engage in actual warfare when bombs were dropped from it upon the town of Guaymas in Mexico during the Mexican Revolution on May 28, 1913.

In 1914 he became the first Hollywood movie pilot. Paramount-Lasky, film producers, approached Martin to play opposite Mary Pickford in a scene from "The Girl of Yesterday" saying that Mary wouldn't go up with anyone else. Martin was opposed to the plan and set $700 a day as his price just to get rid of them. To his surprise, they accepted and for the scene he received more than Mary, herself.

Several more firsts are found on Martin's list of achievements. He was first to fly below sea level, accomplishing this seemingly paradoxial feat at Brawley in the Imperial Valley. He was first to deliver merchandise by air and first to use an airplane in police work.

In 1915, Glenn Martin, piloting, with Fred Mills as passenger went on the first coyote hunt from the air. They bagged one.

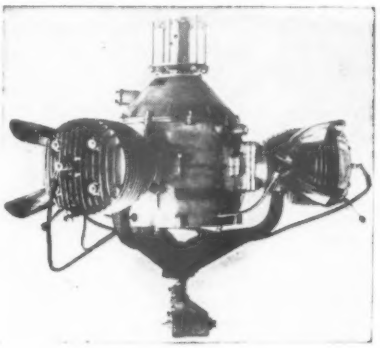
Martin never belonged to the swashbuckling dare-devils of the early days as he was one of the few pilots of that period who knew enough about airplanes to respect their limitations. Nevertheless, he liked his thrills and fun. Aside from his aerial coyote hunting expeditions, he was known to play leapfrog with fishermen on the Pacific when he chanced to be flying his seaplane. He would taxi over the water at a fast rate headed directly at a fishing boat and just before colliding would

(*Concluded on page* 52)

Glenn Martin's crowning achievement: the four-engined Pan American Airways "China Clipper". This photograph was made recently when Martin celebrated his first flight between Los Angeles and Catalina Island by flying a Martin clipper between the same points.

The French Aviasport

A head-on view.



The view from above.

THIS three-cylinder radial air-cooled engine was designed by the Collet company to be used on French lightplanes. The engine develops 26 h.p. at 3,400-3,500 r.p.m. and, with a 3 to 1 reduction gear, turns the propellor at 1,520 r.p.m.

The Aviasport weighs 88 pounds, has a cylinder displacement of 304 cubic inches and has a three-inch bore and stroke.

First-Flight Fad

AIR-MAIL-STAMP and first-flight cover fanatics had a field day recently when Pan American Airways launched its first westbound flight of the *China Clipper* from San Francisco to Hong Kong, China.

The giant four-engined Martin trans-Pacific clipper took off from Alameda harbor carrying a total of 59,930 first-flight covers. Of this number, 43,865 letters went "all the way"; to China, that is.

That first flight wasn't startling only for the number of letters it carried. Can you guess how much money was involved in those letters? Well, it costs 70 cents to mail a half-ounce letter from San Francisco to Macao or Hong Kong. To have it returned to you costs $1.40. Hence, if the clipper flew those 43,865 letters back to this country again something like $61,411 would have changed hands!

THIS Flying Is Breath-Taking

by CHARLES J. BAUER

One way of getting highly intoxicated (minus the breath, however) is to head moonward in an airplane. Meaning 25,000 feet or so. However, we don't recommend you try the experiment recently made by Dr. Armstrong.

THE stratosphere may be aviation's promised land, but until pressure-sealed cabins are perfected it is full of headaches and "cheap drunks."

Dr. Harry G. Armstrong of the army air corps, in charge of studying the effects on flyers of unusual conditions, is our authority for that. He has been subjecting himself to "guinea pig" experiments in TWA's overweather plane, piloted by Lieut. D. W. "Tommy" Tomlinson.

"Tommy" is cutting a pretty wide swath in the lower stratosphere in a study of the feasibility of lifting scheduled airline flight over the weather disturbances that harass earthbound humans.

Dr. Armstrong's interest in the subject is that of a medical man intent on sparing personnel and prospective patrons the temporary discomforts of flying and possible lasting harm of reduced pressure and extreme oxygen-hunger.

The Wright Field officer flew with Tomlinson to 30,000 feet, recording his sensations in handwriting at various levels. While the pilot wore an oxygen mask, Capt. Armstrong was without oxygen up to 25,000 feet—nearly five miles. Then he drank in oxygen while the plane rose to 30,000 feet, and again his supply was cut off as the plane descended at the rate of 2,000 feet per minute.

Dr. Armstrong could not read some of his own writing after he landed, nor could anyone else. The illegibility began on the ascent at 22,000 feet and by the time 24,000 feet was reached the pen yielded absurd hieroglyphics. On the descent the same thing, at about the same levels, occurred.

This is what Dr. Armstrong wrote on the climb:

"A sample of normal handwriting at 2,000 feet; 10,000 feet, breathless; 15,000 feet, feel woosy generally punk feeling some numbless in legs and hands; 1,800 (18,000) feet, faint—numbness in legs—vision fading; 22,000 feet, pail (pale) or rod (ruddy) laskls (looks) pale to me feel better; 23,000 feet, feel good except for deep breathing and both legs numb; 24,000 feet (scribbling); 25,000 feet, oxygen turned on; 26,000 feet, things look brighter—hearing returning—feel O.K. now."

At 22,000 feet Tomlinson had remarked that his companion was red in the face, but Dr. Armstrong wrote "pail or rod—looks pale to me—." Misspelling is one of the marks of mental confusion caused by oxygen hunger. Also, a tendency to drop letters and numerals was observed. Thus Dr. Armstrong repeatedly dropped one zero on his altitude notes, for example writing "2,600" when he meant "26,000."

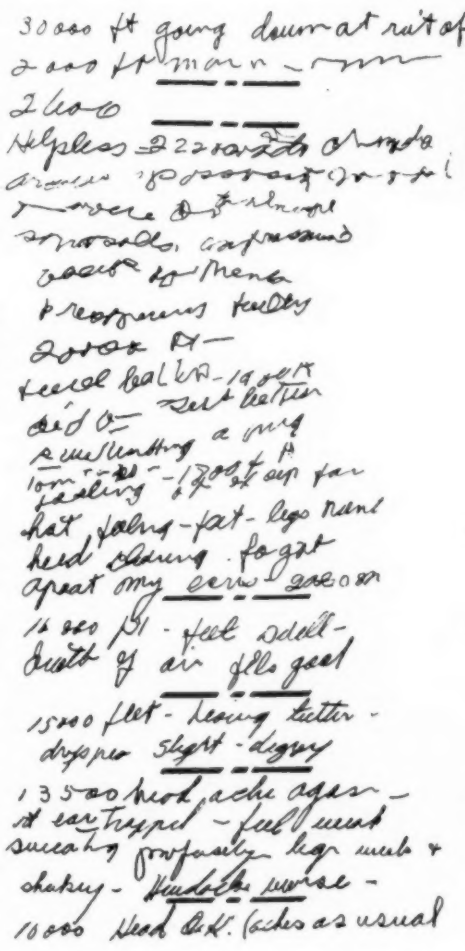
The trip down was even more revealing, to judge from Dr. Armstrong's notes. The oxygen was turned off at 30,000 feet, and eight seconds later he wrote: "30,000 feet going down at rait (rate) of 2,000 feet per minute; 2,600 (26,000); helpless 22,200 (scribbling)—respiration faulty; 20,000 feet—feel better; 19,000 feet ditto - ----- sweating ----; hot feeling—fat—legs numb—head clearing ----; 16,000 feet, feel swell—breath of air feels great; 15,000 feet, doing better -----; 13,500 headache again—right ear trapped—feel weak—sweating profusely —legs weak and shakey — headache worse; 10,000 head O.K. aches as usual."

Dr. Armstrong experienced headache for from 12 to 24 hours after such an experience. The headache first is mentioned at 13,500 feet, but there was a gradual return to mental and physical faculties at about 12,000 feet, he said. The drop from 30,000 feet was made in about 10 minutes.

While the airlines are concerned with the mechanical and engineering difficulties of operating at high altitudes, they also recognize the problem of keeping personnel and passengers comfortable.

(*Concluded on page 62*)

THE EFFECT OF OXYGEN-WANT ON HANDWRITING DURING ASCENT AND DESCENT

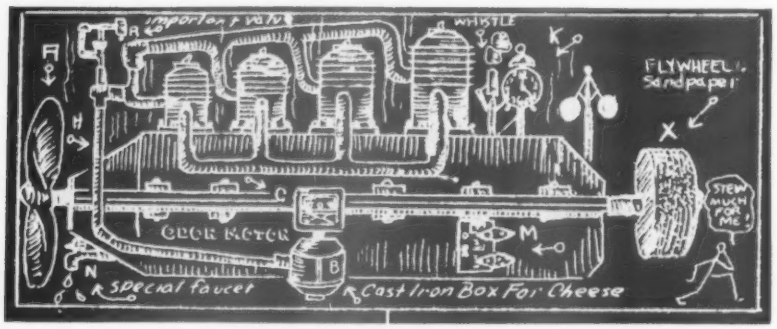


Descent from 30,000 ft. without Oxygen	Explanatory Remarks
30 000 ft going down at rait of 2 000 ft per min — 2 to 0	Eight seconds after oxygen supply removed word "rate" misspelled.
Helpless 22 200 [illegible]	In 15 seconds complete helplessness. Unconscious after 60 seconds which lasted for 60 seconds. Recovered at 26000 ft.
[illegible]	Marked mental confusion and physical inefficiency down to 16,000 ft.
16 000 ft - feel odell - [illegible] of air fills good	First definite improvement.
15000 feet - losing better - dyspnea slight - diggy	
13 500 head ache again — R ear trapped - feel weak sweating profusely legs weak & shakey - Headache worse - 10000 Head O.K. Aches as usual	Gradual return to normal at about 12,000 feet. Descent from 30,000 to 10,000 ft. in 10 minutes.

We Present, Dear Reader, The Odor Motor

by WALT BOHRER

("World's Hungriest Aviator")



This clean-cut, well-designed chart should tell you just what this is all about. (Drop us a line if you can figure it.)

TAKE a squint at this picture. You readers may think it's a map of the Congo jungle or a diagram of Eddie Rickenbacker's new watch, but you're both wrong.

It's an airplane engine run by the odor of limburger cheese—the very last word in the backward development of aviation! Just think of only having to lift your proboscis and say, "Ah, there's something in the air!" and along would come Jimmy Doolittle behind a limburger-engine—which, by the way, is what you'd be smelling and not Jimmy!

This crime was committed by Tex Rankin, no doubt as a discouragement to head winds, and Wallace Beery, who together with a group of the world's greatest engineers, plumbers, surgeons, sniffers and manufacturers of the highest grades of ever-binding cheese, have been in a huddle during the past 58 years and 7 months in the seclusion of an old DH fuselage to complete this great machine of unknown strength and power.

Due to the parts having been picked from the swankiest of city dumps, it can readily be seen that the material used throughout is of the very finest texture and that no expense has been spared in its construction. All parts are accurately turned down and finished to within ¾ inch, more or less. This fact alone should cause the Pratt and Whitney Company at Hartford to turn pink with envy. Of course, sometimes some of the parts do not quite fit, but as these are generally the parts which wear out first it doesn't matter much.

One cannot imagine how terrible the motor really is, both in power and in stench. On a recent demonstration to a group of prominent bootleggers and aviators, the motor proved an immense success, having run a total of 14 seconds during which time it tore itself loose from the test stand anchored in 9 feet of concrete, went through ten hangars and two airplanes, gassed 7 mechanics and one gentleman, finally landing on Col. Roscoe Turner who immediately began turning up 2500!

Here is a brief layout of the engine—in pieces:

The motor is a four-cylinder perpendicular opposed reciprocating twin-six radial—or, maybe, radical. The cylinders, as you notice in the drawing, are graduated in sizes each having a different displacement and is rated in mule power instead of horse power so that in case of extreme emergencies it can be used at any logging camp as a donkey engine. The mule power of the cylinders varies from 10.09724 centimeters, the lowest, to 75.9286 kilometers, the highest. As yet no one has been able to figure the total power of the motor as the power curve runs out at the top of the chart.

The cylinders are made of the highest grade of concrete and are lined with the best available cheese-cloth. A glance at the title will, without a doubt, explain the presence of the cheese-cloth.

The engine derives its power from a heart-rending action of the best limburger cheese. The cheese is placed in a cast iron box (B) and is strongly riveted to prevent its escape. The propeller (A) is one of special design, being made extra small so that the airflow will not disturb the action of the engine proper.

The odor laden air passes from retainer (B) up through a specially built meter (C) which registers constipation. From this meter (C) it passes on upward, more determined than ever, into the cylinders which, in turn, try desperately to get away. But being fixed on circular hinges, all they are able to do is revolve in mad protest.

After doing its best to paralyze the cylinders, the cheesified air passes up through exhaust (F), continues on to pipe (H) and then it suddenly sneaks back down into the retainer to start its journey all over again. And those who are acquainted with the action of limburger will no doubt know that the older the motor gets, the stronger and more determined the mule power becomes.

Now the flywheel (X) has a queer performance, much different than the usual performance of flywheels. In the summer it is equipped with a fan attachment to keep the flies (and the fumes) away from the pilot. It is also equipped with fine sandpaper so that the pilot may manicure his fingernails, polish his teeth and add luster to his eyebrows. Note the alarm clock (K)—a most noteworthy feature.

There is a special attachment to this

(*Concluded on page 66*)

Boston Model Meet

THE Boston Gas Model Society, New England's largest gasoline-engine powered modelplane organization, held its first contest of 1937 at the Boston Metropolitan airport in Canton, Mass.

Harold Thompson of Lynn, Mass., captured the Will Rogers-Wiley Post Memorial Trophy with a flight of 2:59. His ship was an original high-wing monoplane powered with a Brown engine.

John Jorgensen of Beverly, Mass., took second place with a modified KG-3 equipped with a Brown with a flight of 2:32.8. Third place went to Frederick Rooke of Swampscott, Mass., when his original high-wing Gwin-powered monoplane remained aloft for 1:35.

Contestants at the meet were limited to 1/25 of an ounce of fuel per pound of weight. A corresponding timer arrangement permitted timer-controlled flights by some flyers.

A large number of spectators turned out for the battle, although flying conditions were none too good.

The officers of the Society are Bruno Marci, president; Mary Fowler, vice-president; and Albert Lewis, secretary-treasurer.

Pelican Attacks Plane

ARMY pilots at March Field, California, have been known to sneak machine-gun pot shots at passing pelicans during the course of routine Air Corps gunnery practice. Generally speaking, the airmen have been good shots—too good to suit the pelican clan.

But the pelicans, patiently biding their time, got even with the Air Corps in general recently, even though it meant that an upstanding member of the pelican family had to sacrifice his life to get the revenge. . . .

Lieut. Nelson T. Brown was the target for revenge. Lieutenant Brown, flying a Northrop A-17 with Private Frank Barnett as rear gunner, was practicing gunnery off Oceanside, Cal. Neither Lieutenant Brown nor Private Barnett knew it, but the avenging pelican had spotted their ship and was headed in their direction.

Suddenly there was a crash as the bird smashed straight through the Northrop's three-bladed propellor, crashed through Lieutenant Brown's windshield, seriously cut his face and knocked him unconscious, bounded on over the ship, banged into the elevators and bent them, then fell dead down into the ocean.

Frantically, Private Barnett grabbed the auxiliary controls of the ship, brought it to an even keel and held it there until the bloody Lieutenant Brown regained consciousness. The pilot then flew post haste back to March Field where he was given first aid.

Seems that the boys from March Field now fly high and careful and, with a mumbling and bandaged pilot accompanying them on maneuvers, they are content to leave the pelicans to their element.

The Koolhoven F.K. 55 Fighter

by E. J. BULBAN

This novel twin-propellered Dutch pursuit plane is said to have performance never equalled. Top speed is 323 m.p.h. It cruises at 280 m.p.h.

IN A normal discussion of modern military aircraft, the trend usually centers around the latest types of either the United States, Great Britain, France or Italy.

This is due to the fact that countries of their prominence have spent millions on the development and construction of the latest aerial weapons and naturally they receive all the publicity, thereby overshadowing many noteworthy but unsung designs built by the lesser powers.

These smaller nations' versatility is surprising and they have many types that, while not so well known, are at least equal to (if not better than) the larger countries' air equipment.

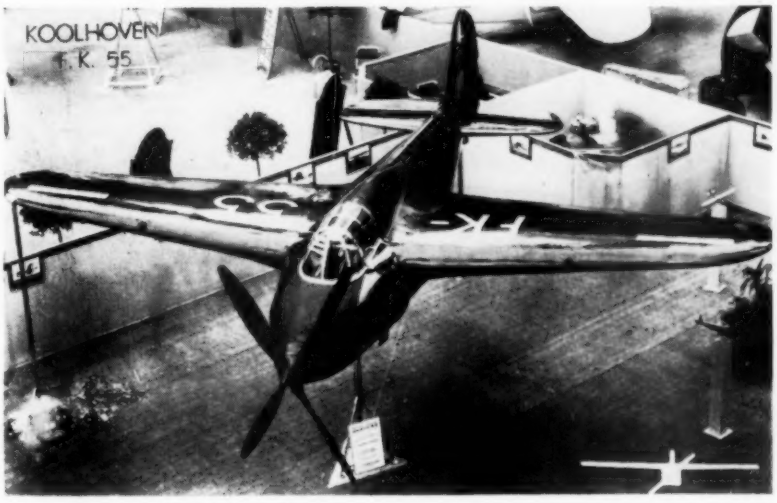
An outstanding example of this is evidenced in Holland's latest military contribution, the Koolhoven F.K. 55 single seater fighter of most unusual design and performance. The plane is turned out by Frederick Koolhoven at Rotterdam, Holland. When it made its first appearance it received much favorable comment and considering the other ships that were exhibited there, it must be good if it could do that.

The Koolhoven F.K. 55 is a single seater monoplane fighter with an enclosed cockpit and retractable landing gear. Several types of motors may be fitted, but at present it is powered with a Lorraine Petrel which supplies 860 h.p. at 13,120 feet.

The engine is mounted below the center section of the wing between the spars and at about the center of gravity of the plane. It drives two metal propellers which turn in opposite directions on a lengthened shaft. This effect is to eliminate torque and make for easier control, at the same time allowing smaller blade diameter and a shorter, lighter landing gear.

The engine, mounted behind the pilot, gives him an unobstructed vision in every direction except straight downwards, and the mounting of the motor on the C.G. makes for easier control and maneuverability. There is one 500-gallon fuel tank in the fuselage, giving the Koolhoven a range of 560 miles at a top speed of 323 m.p.h. And that's with an 860 h.p. motor! I should like to see one of the new Rolls-Royce Merlin engines of 1,000 h.p. plus installed. Goodbye, speed record!

The fuselage is composed of two sections. The front portion, extending to the trailing edge of the wing, is made of welded steel tubes and the rear section is wood, plywood covered. If necessary the fuselage may be entirely of metal. The pilot is seated in a streamlined cupola with a transparent, hinged covering that can be easily detached in an emergency. The pilot is equipped with all the usual flight instruments including the differential machine gun and cannon controls.



The F.K. 55 on display at a recent European aircraft show.

An Oerlikon cannon is mounted directly in front of the pilot and fires through the propeller shaft. Four Browning machine guns are mounted in the wings outside the propeller arc. With this armament a considerable hail of fire can be unleashed, making this an ideal type for attacking bombers or ground targets.

The wing is built in three sections, a center section built integrally with the fuselage and two outer wing panels. The center section contains the wheels and part of the landing gear when retracted.

Careful fairing marks the junction between the wing and fuselage. The outer panels consist of silverspruce spars, three-ply ribs and stressed three-ply skin covering.

There are no landing flaps and in place of the conventional trailing edge ailerons, lip-slot ailerons are located in the center of each wing. By using a low aspect ratio great torsional stiffness is assured, thereby eliminating the risk of wing flutter at high speeds.

The landing gear consists of two independent units equipped with Koolhoven Oleostruts and brakes, completely retractable into the wings and sides of the fuselage.

The tail plane and fin are of wood and are built integral with the fuselage. They are plywood-covered and equipped with trimming tabs, adjustable in flight, for easier control.

The day of the single seater fighter is supposed to be nearing an end. This may be true of present service types but not when considering the Koolhoven. With its speed, high maneuverability factors and firing power it casts a new light on the future fighter.

Specifications of the Koolhoven F.K. 55 fighter powered with a 12-cylinder Lorraine Petrel engine of 860 h.p. are:

DIMENSIONS	
Span	29 ft. 6 in.
Length	27 ft. 7 in.
Height	8 ft. 6 in.
Wing area	168 sq. ft.
WEIGHTS	
Empty	2,420 lb.
Fixed load	154 lb.
Pilot	198 lb.
Fuel for 2 hours	550 lb.
Oil	66 lb.
Armament and ammunition	240 lb.
Loaded	3,630 lb.
PERFORMANCE	
Max. speed—13,120 ft.	323 m.p.h.
Cruising speed—13,120 ft.	280 m.p.h.
Min. gliding speed	68 m.p.h.
Landing speed	62 m.p.h.
Rate of climb (sea level)	2,950 ft./min.
Rate of climb (4000 m.)	3,350 ft./min.
Time to 4000 m.	4.2 min.
Service ceiling (fully loaded)	31,500 ft.

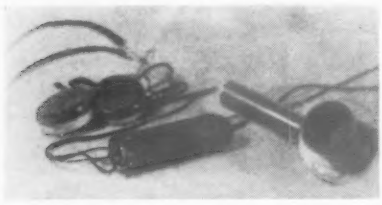
Performance like this has been practically unheard of in anything but the winner of the Schneider Cup races. But the Koolhoven company lays down these figures and backs them up.

The F.K. 55 is a radical departure from anything ever attempted in the Koolhoven plant. Frederick Koolhoven has built aircraft since 1910 and has designed more than 50 types of planes ranging from light sport planes to multi-engined transports.

Koolhoven designs are very clean and each ship has turned in commendable performance records. The company at present is marketing 11 models including the F.K. 55.

END

Improvises Phone



This set costs but a few cents.

A FLYING instructor in New Jersey has, until recently, been having difficulty in making himself understood in flight. So, after getting his signals mixed with students several times, this instructor designed himself an inexpensive, simple telephone system which is shown above.

The instructor simply connected a small hand microphone and headphones to two or more ordinary flashlight batteries (according to the volume desired). He simply taped the batteries to a piece of stick, gave his student the earphones and went to work.

Seversky Lists Plans

WITH an eye to this year's potential domestic and export $15,000,000 airplane business Maj. Alexander (Sascha) Seversky has announced that several important improvements have been incorporated in his famous all-purpose design which will place his latest model in the seven-mile-a-minute class. What these improvements are, naturally, must remain a military secret.

One refinement, however, may be mentioned openly. It is the retractable crash protector; the metal piece just aft of the pilot's head to save him in the event of nose-over.

The patented device, which works in connection with the retractable landing-gear, sinks down into the head rest to eliminate the inordinately excessive drag of fixed head protectors now in use. Its operation is entirely automatic, in that raising or lowering the wheels puts it in whatever desired position.

Major Seversky is not content to rest his bid for business on ship performance alone. Equally important in the eyes of his market is the matter of prompt delivery and, from a military standpoint, quantity production. With this in mind the Seversky company acquired all the factory facilities surrounding the Farmingdale, L. I., airport—not to mention a nearby seaplane base.

With ample space assured, Maj. Seversky directed his attention to the task of mass production. He first divided his factory into three individual divisions; one for American military use, one for civilian and the other for export orders. Next the task of cooling presented itself.

But since all Seversky models are

(*Concluded on page* 60)

Meet Fred Fagg, Jr., Air Commerce Director

THIS is the man who today has America's aviation industry holding its figurative breath. In this tall, hefty halfback-like man lies much of American commercial aviation's immediate future.

No one yet really knows just what Fred Dow Fagg, Jr., is going to do about civil aviation in the United States. But, when President Roosevelt confirmed Fagg's appointment as Air Commerce director to succeed the much-hounded Eugene Luther Vidal, one of the agreements made with Fagg was that he was to have almost unlimited powers. To date, silence has played the leading role so far as the Air Commerce director's office is concerned. It's that silence that has the aeronautical brothers wondering. . . .

Outside of perhaps Major Rudolph W. "Shorty" Schroeder (who recently resigned as Fagg's assistant director to accept an executive position in United Airlines' operations department), no one in the United States is better fitted for the job of Air Commerce director than Fred Fagg. Like many an American aviation veteran, Fagg has been active in aeronautics in this country since the World War. In that mad scramble he served as a second lieutenant in the 92nd Aero squadron in France.

From France, Fagg returned to continue his law studies which the war interrupted. In 1927 he received his law degree from Northwestern University at Evanston, Ill. Too, he is a graduate of the University of Redlands, Redlands, Cal., and holds an M.A. degree at Harvard University.

Aviation, however, definitely was in Fred Fagg's blood so he did what many a wise man has done: he combined his business with his pleasure and today is known as one of the world's few authorities on air law. After two years as a teacher at the University of Southern California, he went to Germany in 1929 as exchange professor of the air law institute of Konigsberg. When he returned to this country the following yeaf, he joined the faculty of Northwestern University's law school where he remained until his recent appointment to the Bureau of Air Commerce.

At Northwestern, the young (41) and indomitable Mr. Fagg was determined to establish aeronautical law as an American institution. Soon after joining the faculty of the middle-western university, he sponsored an organization to study the legal aspects of the rapidly expanding aviation industry. A group of Chicagoans became interested in his plans and, with the aid of the Guggenheim Foundation, sufficient money was provided and Northwestern University's famed Institute of Air Law was established and Fred Fagg was named managing director. It is the purpose of this institute to provide information and reports on air law, the collection of a reference library and the provision of graduate fellowships for research in air law.

Fred Dow Fagg, Jr.

In line with his new duties as professor of air law at Northwestern, Fagg also founded and became editor of the Northwestern University Journal of Air Law, probably today's leading publication devoted exclusively to legal problems associated with aeronautics.

First connection with government aviation problems came for Fred Fagg in 1934 when, with John H. Wigmore, dean emeritus of the Northwestern University law school, he was appointed legal adviser of the Federal Aviation Commission in the drafting of a congressional report on a national policy covering all phases of air transportation. During that same year Fagg also served on a national advisory committee of the Independent Aviation Operators of the United States. Meanwhile, he had become secretary-treasurer of the National Association of State Aviation Officials as well as a member of the Illinois Aeronautics Commission, both of which he still is today. Mr. Fagg has still another title: American delegate to the Air Law Institute of the International Chamber of Commerce.

Meanwhile, during the past year both he and Dean Wigmore have been revising regulations of the Bureau of Air Commerce. . . .

First work to be done is the reorganization of the Bureau of Air Commerce structure which already has started. Revision of certain air laws then is expected to follow.

Until his recent appointment as Air Commerce director, the Faggs (Mr., Mrs., and Miss Barbara Louise) made their home in Wilmette, Ill., a northern suburb of Chicago. Now, however, they have moved to Washington, D. C., their new home—by Presidential approval.

What Our Readers Are Building

In keeping with our policy of giving the amateur lightplane builder a choice to display his wares to the nation, POPULAR AVIATION *again presents the work of two more of its readers. The three photographs at the right are concrete proof that the American amateur is far from being the aeronautical hoodlum some authorities would like to make him appear.*

LET the manufacturers of American lightplanes take a good look at this. "This" happens to be a pair of homebuilt jobs that are the products of two POPULAR AVIATION readers and, unless we're sadly mistaken, the two homebuilt jobs have got it all over many commercial lightplane models.

Outstanding ship of the pair is the small one-place biplane designed and built by M. E. Westfall of Oklahoma City, Okla. To top it all off Mr. Westfall never realized he had a crackerjack airplane until two old-time airmen flew the ship and praised him highly for his work. Reason for this was that, although he never has had any solo time on another airplane, he has soloed and subsequently flown his airplane more than 250 hours without realizing that he was getting far better performance with his ship than hundreds of other lightplane pilots!

First Westfall powered his airplane with a Ford Model "A" engine. With this motor he got a top speed of 105 m.p.h., landing speed of 30 m.p.h., a 700 f.p.m. climb and a 14,000 ft. ceiling. Later, however, after having flown the ship for 250 hours with the Ford engine, Westfall rebuilt the ship. By replacing the Ford engine with a 65 h.p. Le Blond he lightened the ship 131 lbs. In addition, Westfall writes, he installed lighter struts and made other minor changes that cut down the weight even more. Then—he test-hopped it. And what performance!

Westfall's ship now climbs 1,250 f.p.m., has a top speed of 120 m.p.h., lands at 25 m.p.h., cruises at 105 m.p.h. and has a ceiling of 23,500 ft.! To those who may be interested further in Westfall's high-performance lightplane, here are the dimensions: Span (upper wing) 25 ft. Span (lower wing) 23 ft. Wing loading 4.65/88 lbs. per sq. ft. Length 15 ft. 4 in. Weight loaded 834 lbs. Weight empty 560 lbs. Gasoline capacity 15 gals. Cruising range 315 miles. All that with a 65 h.p. engine!

But if Mr. Westfall is worthy of commendation for his airplane so, then, are George and Ivan Prentice of Park Rapids, Minn. These lads built themselves a Pietenpol Air Camper but, as *neither of them can fly*, they had to get someone else to test-hop the ship for them! They tell

This is the Westfall biplane as it appeared when powered with a Ford engine.

Does this look like the work of an amateur? It's the Westfall ship shown in the top photograph but with a Le Blond engine substituted.

The Minnesota brothers that built this trim job even had to get someone to test-hop the ship for them! Neither of them ever flew an airplane in their lives!

how they solved this novel predicament in a letter to POPULAR AVIATION:

"We finally got in touch with Elon Cary, acting superintendent of Itasca State Park (Minnesota) who has done some flying but not since 1929. He hadn't been in an airplane since that date.

"The plane was test flown in the presence of several hundred people and Mr. Cary pronounced it a perfect job. All tests were made with the plane as rigged in the shop and no adjustments were necessary. The plane has proved so successful that we plan to start another as soon as possible."

So, here again amateurs have shown state and federal licensing "experts" that it takes more than the knowing approval of an "authority" to make an airplane really good. Still, as Westfall writes, "the state law in Oklahoma has made it very hard on fellows who have unlicensed planes, especially in Oklahoma County. You see, the law forbids unlicensed planes to be flown in the state . . . "

If any of these licensing authorities can openly give POPULAR AVIATION a legitimate reason for maintaining these idiotic bans we will be more than glad to hear from them.

END

SOMEONE in this country recently said that a $700 airplane is "an impossibility". So, as usually is the case, it remains for an air-minded designer who lacks the supposedly well-founded prejudices against any airplane that costs less than $2,000, to go ahead and build himself a ship for even less than $700. Then the know-it-alls scoff and say "there is no such animal".

But there is such an animal and it cost not $700 but $500. And in addition we have a photograph to prove there is such an animal.

The new machine is a product of a rising British aircraft manufacturer, Luton Aircraft, Ltd. While American builders are content to "turn 'em out high-priced," C. H. Latimer Needham, chief designer and managing director of Luton aircraft, produced the "impossible" machine shown in the accompanying photograph. Powered with an ordinary motorcycle engine that runs on ordinary gasoline, the new plane has a top speed of 85 m.p.h. and a cruising range of 300 miles.

To any American lightplane builder who still says it can't be done, we'll gladly supply them with the Luton company's address.

It may look a little small and somewhat windy but nevertheless it's a real $500 airplane, complete to tail wheel. The ship was designed by C. H. Latimer-Needham, prominent British lightplane builder.

Name Hughes World's Fair Air Adviser

PREPARING for the major part aviation will play in the New York World's Fair of 1939, Fair officials recently announced the appointment of Howard Hughes, famed millionaire and transcontinental speed flyer, as aeronautical adviser to the Fair. The appointment was made by Grover Whalen, president of the Fair corporation.

The aviation exhibit now planned for the Fair will be probably the most elaborate ever established in this country. According to Mr. Whalen, "the Fair's presentation of flying will include not only the exhibit of planes, engines and pilot-guiding instruments, but also a modern airport complete to hangars and other necessary appurtenances.

Howard Hughes was chosen for the position of aeronautical adviser to the Fair because "he represents the younger element" (he's 31) and because of his "aeronautical achievements and outlook upon the future". During the past few years Hughes has established several national and world speed records. In September, 1935, he set the present world's landplane speed record of 352 m.p.h. In January, 1936, he averaged 265 m.p.h. on a dash from Burbank, Cal. to Newark, N. J. He averaged 276 m.p.h. from Miami to New York in April, 1936. Latest record set by Hughes was in January of this year when he flew from Los Angeles to New York in 7 hours 28 minutes, at times averaging more than 300 m.p.h. Hughes recently was awarded the Harmon Trophy for being the year's "most outstanding airman".

Meanwhile, it has been reported that Hughes has purchased a Sikorsky S-43 which, it is said, he plans to fly around the world in the near future.

Our Back Cover

FOURTEEN thousand feet — more than two and one-half miles—over eastern Michigan one day recently a brilliant sun glistened on a tight formation of six Martin B-10 Army bombers. Still higher and two miles behind flew a lone Consolidated PB2-A piloted by Lieut. H. L. Kreider of the 27th Pursuit Squadron of the First Pursuit Group. Half an hour before, all seven ships had taken off from rain-swept Selfridge Field, key Army Air Corps base at Mt. Clemens, Mich.

Riding in the rear gunner's cockpit of the Martin flown by the bombers' flight commander, POPULAR AVIATION Photographer N. R. Strohmeyer shot more than a score of natural color photographs. Photographer Strohmeyer "posed" various ships to suit his needs through two-way radio communications, standard equipment on virtually all Air Corps planes today. When he finished photographing bombardment maneuvers, Strohmeyer spoke into his microphone and Lieutenant Kreider, still two miles back, dipped the nose of his speedy two-place pursuiter, caught up with the Martin in which Strohmeyer was working and "posed" according to radioed instructions for a fine series of color pictures, one of which is reproduced on the back cover of this issue.

Through the kind cooperation and assistance of officers and personnel of the First Pursuit Group, POPULAR AVIATION is able to present, probably for the first time in any publication, flight photographs in true natural color.

Meanwhile, POPULAR AVIATION extends hearty thanks to the First Pursuit and Ninth Bombardment Groups.

Government to Spend $1,000,000 on Wind

A GOVERNMENT award for the construction of a High Pressure Wind Tunnel at Langley Field, Va., for aeronautic experimental work, was received recently by the Pittsburgh Des Moines Steel Company.

The project, under the supervision of the National Advisory Committee for Aeronautics, is the first of its kind in the country. It will cost approximately $1,000,000. The tunnel, when completed in 1938, will be used to advance the government's knowledge of aerodynamics in relation to airplane design and construction.

The cylindrical tunnel arranged in rectangular fashion will have a total length of 380 feet. Diameter will vary from 19 to 54 feet at its widest point. Density of the air on the inside of the tunnel will be twice that in which we normally live.

A wind velocity of 200 miles per hour or 17,600 feet per minute, will be created within the tunnel by means of a thirty foot multi-blade propeller, driven by a specially designed electric motor of 8,000 horsepower. The effect on model planes tested in this tunnel will be that of a 400 mile per hour gale.

Barkley-Grow Develops New Wing

by M. K. CASS

Patented by A. S. Barkley several years ago, this new wing structure made its first public appearance recently in the Barkley-Grow T8P-1 twin-engined transport. The structure is exceptionally strong.

INCORPORATING a radically new method and design of wing construction which was invented and patented by Archiebald S. Barkley, the twin-engined low-wing Barkley-Grow T8P-1 monoplane transport recently was placed on the commercial market as an ideal "feeder transport, corporation executive transport, de luxe air cruiser, military ambulance or military light bomber," according to its Detroit manufacturers.

The new ship's (one airplane of this type has been built to date) outstanding feature is the Barkley wing which is of a new multi-spar, stressed skin construction. This wing consists of a number of full length spanwise webs and flanges of suitably formed and lightened thin sheet metal to which the top and bottom coverings (also metal) are attached.

According to the Barkley patent, this method of construction results in a number of uniformly tapering, full span cells. Unlike the conventional airplane wing, there are no fore and aft ribs. Preliminary and static tests have shown this wing construction to be extremely stiff under all loading conditions and therefore is highly resistant to wing flutter. However, like the conventional wing on aircraft of this type, the Barkley wing is detachable at the center section, making for easy shipment and assembly.

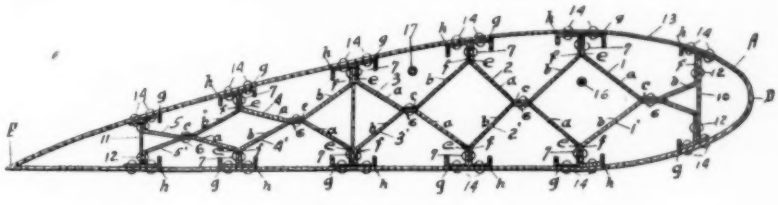
In describing his wing structure and design to the United States Patent Office, Mr. Barkley wrote:

"The object of my invention is to produce a light, strong wing construction that will eliminate the requirement for the heavy beam spar now commonly used in airplane structures, yet retain the strength and rigidity in the wing section both laterally and horizontally.

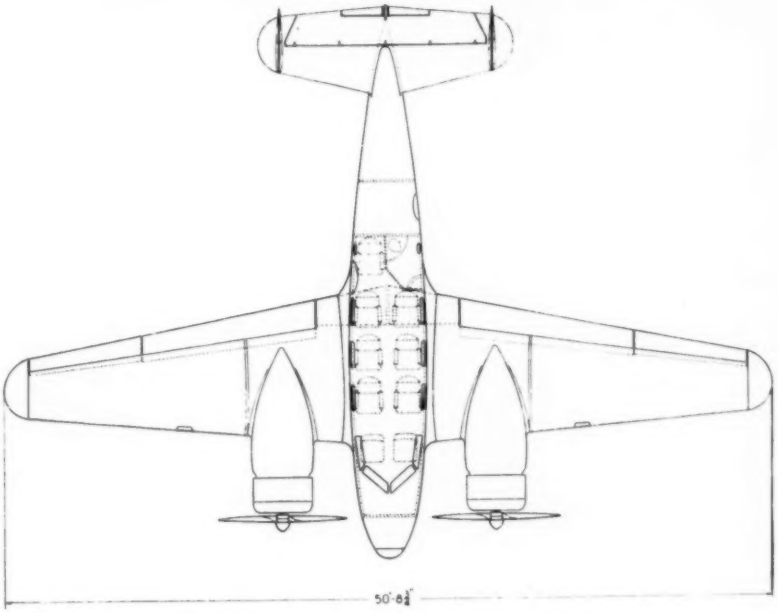
"Another object is to produce a wing structure formed of flanged sheet metal segments, so designed and connected as to provide a plurality of connected, hollow tubular shaped spars the full width of the wing and extending the entire wing length, forming a full wing structure suitable for mounting the sheet metal wing covering or skin thereon . . . "

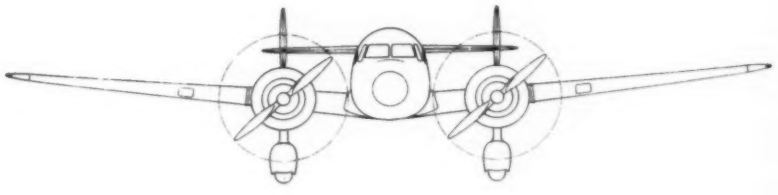
Other than the new, economical wing structure, however, the Barkley-Grow T8P-1 generally is a conventional airplane. Powered with two Pratt and Whitney Wasp Jr. engines of 400 h.p. each (two other proposed models are to be offered with Jacobs and Wright engines), the T8P-1 can accommodate one pilot and seven passengers or two pilots and six passengers. Maximum speed at sea level, according to the manufacturer,

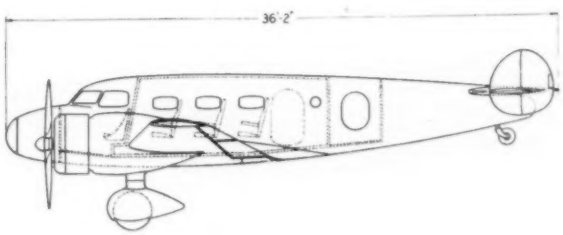
(*Concluded on page* 54)



This is Barkley's invention as drawn for the United States Patent Office.







Chinese Woman Pilot Visits America

by HELEN WATERHOUSE

Women in aviation provide the discussion topic for Miss Cheung (left), Mrs. Dugan (center) and Miss Chatterton (right).

"THE old folks in China won't like flying at first, of course; but they'll get used to it", predicted Katherine Sui Fun Cheung recently, as she chatted with Ruth Chatterton, sponsor of the famous sportsman pilots' derby from Cleveland to the west coast, and with Mrs. F. F. Dugan, president of the largest women's branch of the National Aeronautical Association in the country.

Miss Cheung, attired in an American sports suit and wearing a broad-brimmed leghorn hat, had just flown into Cleveland, O., from Los Angeles in her Fleet biplane which was rated at 85 miles an hour. As one of the entrants in the derby, she was given No. 1 take-off position on the return trip to California due to the fact that her plane was the slowest in the race.

The petite smiling Chinese girl was telling Miss Chatterton and Mrs. Dugan of her plans to return to her own country at the end of the year to start a flying school.

"As soon as I finish my course at the University of Southern California I will return to my homeland," she said. "I think there is a big field for women fliers in China."

She scoffed at the suggestion made by someone who had heard that the Chinese were the hardest race in the world to teach to fly.

"I soloed after 12½ hours dual time", she said: "We are getting all American planes in our country which will make it much easier, anyway. That's all wrong that the Chinese can't learn to fly."

The slender young Oriental said she had come to this country eight years ago to study music. A few years later she became interested in aviation and started taking lessons from an American pilot. She soon won her pilot's license. Her home is in Canton.

Miss Chatterton, clad in white sports suit, announced she hoped the National Air Races would be held in Cleveland next year,—"in spite of the fact that my home city is Los Angeles."

Mrs. Dugan, with a large delegation of her society from Akron, O., sat with Miss Cheung and Miss Chatterton at a banquet given shortly before the fliers took off for the west coast again.

Are You Going to Buy a Used Plane?

SEVERAL important "do's" and "don'ts" for prospective used-airplane buyers have been compiled by the Aero Insurance Underwriters that are well worth anyone's few moments of reading:

Make sure the airplane has been inspected by a licensed mechanic who has certified to the condition and airworthiness of the airplanes by signing his name in the log book.

Be sure that control surface bearings have not been reamed out so much as to leave the remaining metal dangerously thin; the same is true of landing gear fittings.

Examine the control wires for fraying; the control tubes at the bearings for wear.

Determine whether or not the ship has ever been in an accident. If so, see what replacements and repairs have been made. Was the accident and repair recorded in the plane's log book?

Though repair jobs can be as safe as a new job, inspect all mends carefully.

Look for corrosion at all important fittings and under soundproofing. *Beware of corrosion and crystallization.* They are the airplane's deadliest enemies.

Get complete data on the history of the propellor. Has it ever been bent? Who straightened it?

How often was the oil changed? Was the mechanic who serviced the ship a reliable one?

Be sure the ship's log book has been carefully kept up. Check this log book minutely. Make sure that no "minor" damage has been overlooked and see that all repairs have been made as stated. In other words, no matter how minor a certain point may seem, never take a chance.

All these warnings and more are to be taken quite seriously. Though some may appear insignificant here in print, a few thousand feet in the air such an oversight can cause the gravest of accidents.

Vibrometer Developed

BY applying a new vibrometer recently invented and developed at the Daniel Guggenheim School of Aeronautics, New York University, to any part of an airplane, artificial vibrations are set up which can be measured automatically.

Constructed and tested on a Works Progress Administration project under the direction of Dr. Alexander Klemin, Guggenheim school director, the instrument was devised by F. K. Teichmann, professor of aeronautics at the school, and Martin Coan, electrical engineer and project supervisor.

With large military and commercial aircraft operating at speeds of more than 200 m.p.h., vibration has become an important consideration. The new vibrometer is expected to prove of considerable value in helping eliminate some of this vibration. One of the vibrometer's special uses is that it is well adapted to the determination of airplane parts that vibrate "in sympathy."

An improved model of this device now is under construction which will be equipped with a motion picture attachment. In this way vibrations can be recorded graphically and tests can be made even in full flight.

'Chutes for Planes

ADVOCATES of a parachute for whole planes are growing in number. This safety measure has been receiving much experimental study at Wright Field, and now George Francis Myers, a patent attorney of New York and member of the Early Birds, explains the problem in simple terms:

"Objections will be raised that the cost, weight and space of the plane parachute will be high, but as far as can be seen it will be no greater than that of the equipment of the radio and finder.

"In the case of a transport plane, a large enough parachute to bring the plane down safely would take too long to open up, and in the meantime the machine might have reached the ground. So place four smaller parachutes, all easily ejected from the machine and easily opened, but tied together at their edges, or other places, in such a manner that when fully expanded they form a large parachute.

Ah, These Salesmen!

AN air-minded automobile dealer of Glendale, Cal., has it all figured out so that he as well as the airlines will get a break in the future.

First, you buy a car from the dealer. Then you board an airliner in California for Pontiac, Mich., where you take delivery of your car right at the factory. Then you just take your choice of any number of pleasant, scenic routes back to California.

The dealer points out that the entire trip, including airline transportation, meals, gas and oil, is approximately the same as if the car buyer had taken delivery of his car at Glendale and paid the freight charges.

PICTURES OF THE MONTH

★

THE NEW SEVERSKY P-35

HERE IT COMES

SCREAMING out of the heavens—a glistening new Seversky P-35. At the controls Major Alexander P. de Seversky eases the roaring ship out of its dive (1), dips the right wing into a slow roll. (2). The red, white and blue Air Corps insignia flashes momentarily in the camera lens as the powerful fighter rolls over on its back (3), then falls nose down into a spin (4). A quick yank on the controls and Major Seversky gets a fleeting unusual glimpse of the earth (5), then with a roar the engine pulls the ship into level flight (6). Major Seversky slides back the cockpit cover to let the cool wind ease the effects of a lightning maneuver that took but a fraction of a minute to flash from the top to the bottom of this page. Today Major Seversky (he's president, test-pilot, engineer and designer) can boast of fat U. S. Army Air Corps contracts, one of which is for a sizeable batch of P-35's. The Boss does much of the test-hopping at Seversky Aircraft's Farmingdale, Long Island, plant.

The Bristol Cowling

Inside manifold connections.

FOLLOWING the invention and adoption by American manufacturers of the new controllable engine cowling, British firms have taken up the idea and now are using it on Royal Air Force aircraft. The automatic cowling shown above was designed and built by the Bristol Aeroplane Co., Ltd.

By using the new cowling Bristol engineers have found that it gives important control of the flow of air around the engine itself and temperatures can be automatically regulated and controlled by the pilot in flight.

Principle of the Bristol cowl is an endless chain that runs inside the rear cowl support ring and operates a screw mechanism through sprocket wheels. The device is irreversible so that normal flight loads do not continuously act upon the operating mechanism. Additional weight involved by the use of the new cowling totals 25 lbs.

The outer shell assembled.

A Simple Chart for Climb and Ceiling

MOST lightplane fans, sooner or later, have an overwhelming desire to design and build a high performing lightplane—something different from the usual line of "home made crates."

Their ambition is to design a lightplane which will "fly circles around any type in its weight or power class." This desire outweighs any question of the fan's ability to design a job of this type.

Lacking an engineering education he learns a few formulae for performance and adds what experience he learns in building lightplanes, and frequently turns out quite a creditable crate.

Before building the job, it is advantageous to be able to calculate its performance. Usually the amateur designer can determine high speed and landing speed, etc., with simple formulae. But rate of climb and ceiling usually is too difficult for him to determine, without going into involved and complex calculations.

The author, feeling the need of some simple and fast method for determining rate of climb ceiling, made the accompanying chart. This provides the means to determine rate of climb and ceiling very easily, if wing loading (W.L.) and power loading (P.L.) are known.

For example, we will compute the rate of climb and service ceiling for a single place ship. We will assume the ship to have a gross weight of 525 pounds, 95 square feet of wing area, and a 35 horse power motor in the nose. First thing we do is find the wing loading, which is: $525/95 = 5.53$ pounds per square foot, then the power loading is $525/35 = 15.80$ pounds per horse power.

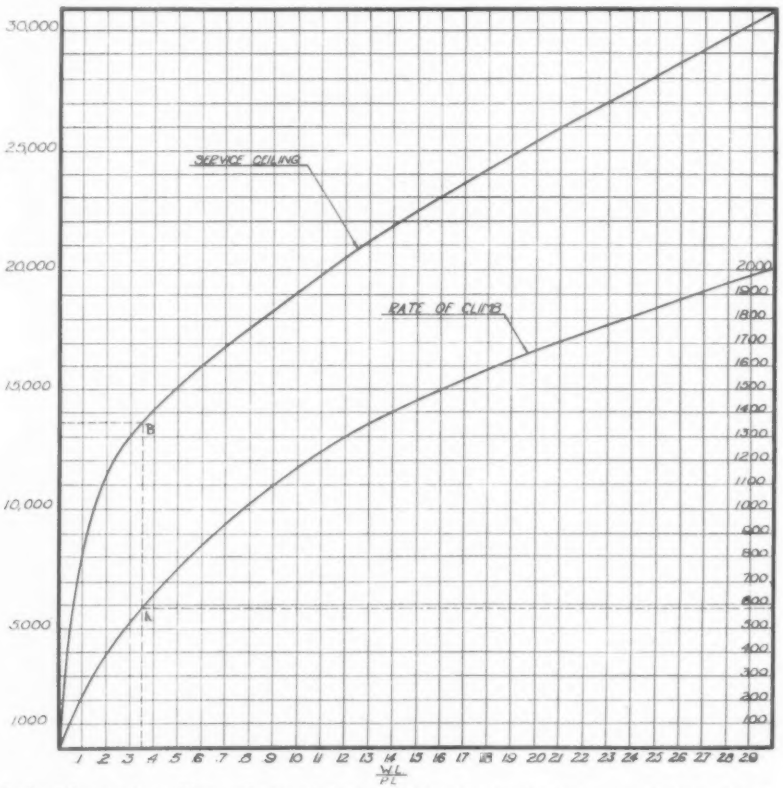
Our ratio of W. L./P. L. is $5.53/15.80 = .35$. On the chart we find the point where the ratio of W.L./P.L. is .35, we then go up on the chart till we intersect the rate of climb curve at point A, and then read across to the right to find our rate of climb, which is 590 feet per minute.

For service ceiling we continue up until we intersect that curve at point B, and read to the left for our ceiling, which is 13,600 feet.

This chart can also be worked in the reverse direction, that is, when the service ceiling or rate of climb are given and we wish to find the wing loading and power loading.

EXAMPLE. The desired ceiling of a projected plane is to be 20,000 feet. Find the horsepower and area.

SOLUTION. The chart shows a ratio of 1.10 for this condition, hence the power loading is 1.10 times the wing loading. Any area and any power loading that will give a ratio of 1.10 will satisfy the condition. Thus, if we decide upon a power loading of 10 pounds per horsepower, the wing loading will be: $1.10 \times 10 = 11$ pounds per horsepower.



A chart for service ceiling and rate of climb. Divide wing loading by power loading, locate the corresponding figure on the lower scale, and then trace up to rate of climb, as at (A) or ceiling as at (B).

Basic Aircraft Wing Designs

by RAOUL J. HOFFMAN

Here's the sort of information that should give the amateur airplane designer and builder something to think about. The always efficient Hoffman charts and diagrams round out the job.

WINGS in motion are a means of sustaining airplanes in the air by aerodynamic forces; forces created by displacement of air from a high level to a lower level.

These lift forces depend not only on the inclination (angle of attack) of the airfoil and its speed relative to the air but also on its smoothness. Therefore the wing should move so that it leaves the least amount of turbulence in its track, and all non-lifting units and all units required for landing only should be retracted after take-off. This means that it is contended to retract the landing gear, the control surfaces (if they are not part of the wing) or even the propeller if a better gliding angle is wanted. No doubt this will lead toward the flying wing or all-wing.

Another objective of an efficient wing design is to make it as light as possible, yet able to withstand all necessary maneuvering in the air and on the ground. The lightest structure will be of wood, suitable for the manufacturing of low powered planes. For larger machines wood will be surpassed by heat-treated duralumin and heat-treated steel beyond the 160,000 lb. per sq. in. strength.

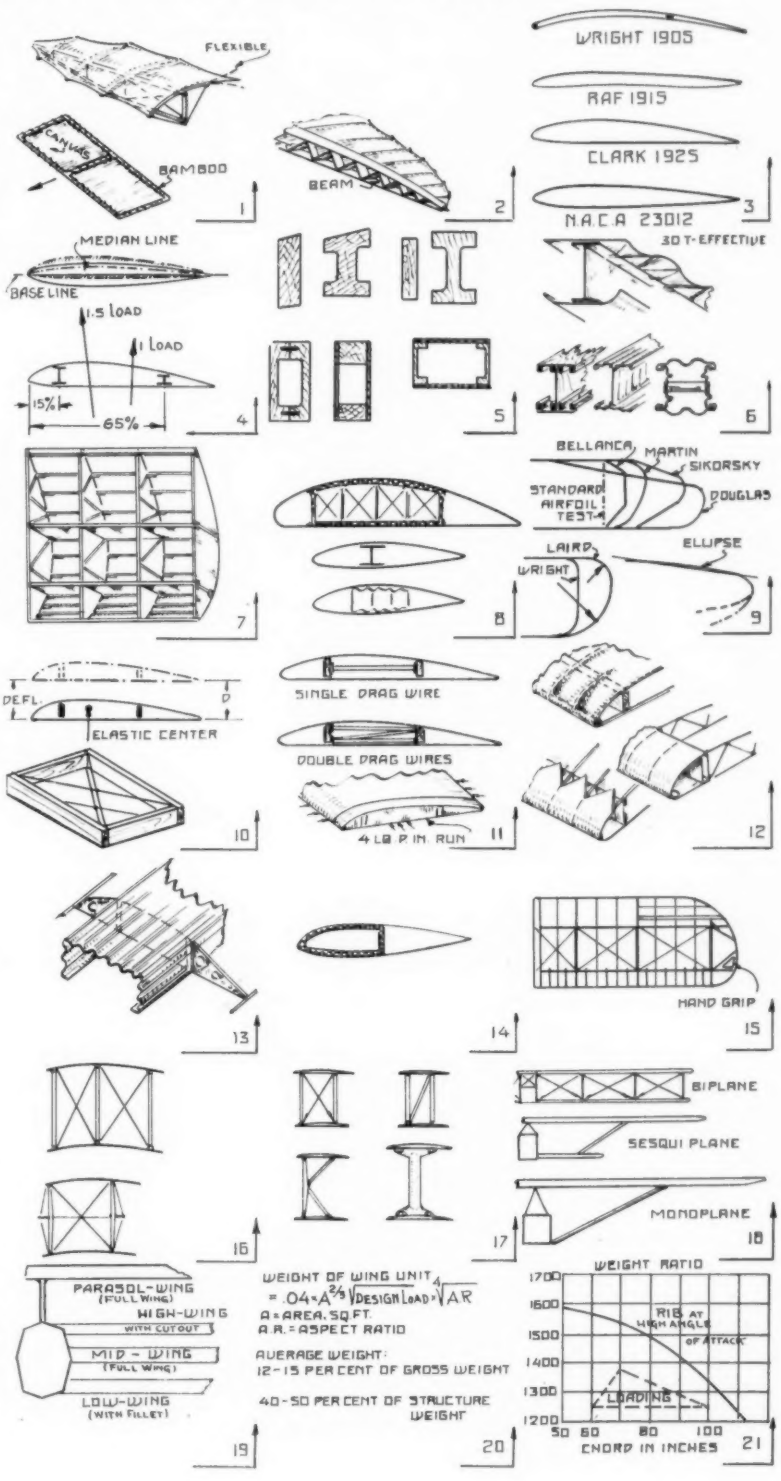
Advancement in wing designs is parallel with the advancement of aero engineering. Some of the early airplanes were monoplanes with supporting structure under the wings and with flexible trailing edges; a poor imitation of the bird wing. Even the simplest design of stretching canvas between bamboo frames did not solve the problem of flying (Sections 1 and 2).

But the systematic testing of models and full-sized planes developed aeronautical science to where it is today. Section 3 shows some of the preferred airfoil sections at the various stages of aeronautical advancement. The sections of the Wright brothers, the R. A. F. 15, the Clark Y and the latest one with a small travel of center of pressure, the N. A. C. A. 23012 all are examples of this.

The basic idea in developing an airfoil section is to take a streamline section and arch its base line so that the maximum height of the arc is close to the entering edge. This curved base line (called the median line) is an indicator of the characteristics of an airfoil section if its thickness to chord ratio is known (see Section 4).

Standard airfoil sections have a certain travel at the center of pressure. Usually the resultant at a high angle of attack passes at about 30 per cent of the chord and at a low angle at 50 per cent of the chord. The design loading for the high angle of attack is assumed to be 50 per cent higher than the one for the low angle of attack.

By supporting the wing with two



beams (spars) and making the strength-weight ratio proportional to the height of the beam, the lightest design will be placing the front beam at 15 per cent from the leading edge and the rear beam at 65 per cent, with the same factor of safety in both beams.

Section 5 shows designs of a few wood beams, solid beams, I-beams and box beams. In thin wings the beams have sloping top and bottom lines in order to utilize space. The farther the material is placed from the neutral axis (horizontal gravity line) the stronger the beam will be. Therefore the I-beam is stronger than the solid beam. A box beam is nothing more than a split I-beam reglued at the flanges.

Placing material away from the center to gain strength will cause thin flanges. Loading such beams the flanges will wrinkle or bend inward. Until recently the accepted standard in structural estimates was to assume 30 times the thickness of the thin flange in order to be working effectively with the rest of the beam. Lately, however, estimates of strength calculation of thin flanges or "skins" were made possible and are known under the term of "stressed skin" calculations.

Just placing a thin cover, paper or sheet, over a structure does not constitute a stressed skin design. Section 6 shows methods of equalizing stresses in thin material by adding stiffeners, as in wood structure. Or, by corrugating the material when metal is used, the stiffeners and corrugations are usually placed in the direction of the stress. Section 7 shows a wooden wing of stressed skin design (plywood). Section 8 shows a large wing and two small wings of stressed metal skin structure.

The plan form (outline) of the wing complicates the design, especially the shape of the wing tip. The theoretical elliptical loading would suggest an elliptical plan form, but making at least the leading edge a straight line will not show any noticeable difference in performances but would add tremendous advantages to production and to strength. Further, the plan form also depends on the airfoil section used and the general design of the airplane. Some of the wing tips are illustrated in Section 9.

The use of two beams for support brings up the problem of deflection. In spite of the fact that both beams have the same factor of safety under static loading, they may not be suitable for flight if their deflections are not the same; it may cause the wing to flutter. One point, the elastic center of the wing, is of importance for if load is applied at this point the wing will deflect parallel to itself. Naturally the center of pressure should coincide with the elastic center; but there is no fixed center of pressure on the average airfoil. The wing, therefore, should be made as rigid as possible. Section 10 shows a frame, indicated by two beams and two compression struts, made rigid by double wire bracings. The compres-

(*Concluded on page 52*)

More Airline Hostesses

BY the time this reaches the newsstands two more U. S. airlines will have installed "fleets" of regulation airline hostesses. One line, Braniff Airways, has a new twist in its requirements of the girls. Every senorita who flies the Chicago-Oklahoma City-Fort Worth-Brownsville line not only must be a registered nurse, be 26 years old or less, no taller than five feet four inches, etc., but she must be able to speak Spanish fluently!

According to T. E. Braniff, president of the line, this requirement was included because of the large number of Spanish-speaking people that travel the line between Mexico and the United States.

Meanwhile, the other major company to adopt hostesses is Northwest Airlines. No special requirements other than those already standardized by other airlines are asked. These girls will be the third members of the crews that will fly Northwest's new Lockheed Super-Electras between Chicago, the Twin Cities, Billings, Mont., and Seattle, Wash.

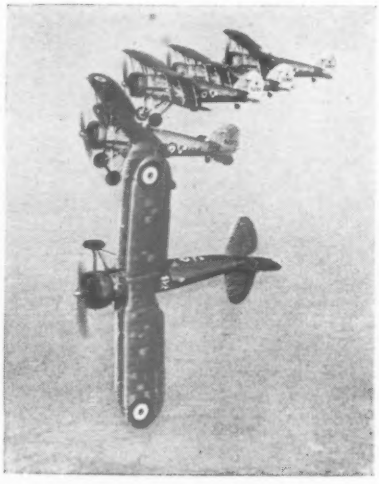
Neither Braniff nor Northwest employed hostesses before.

The "Gloster" Gladiator

ROYAL AIR FORCE pursuit pilots, despite the advent of recent British high-performance monoplane fighters, still seem to favor the old stand-by biplane fighters characterized by the Gloster Gladiator. The fine action photograph below shows a flight of Gladiators roaring into action during recent British war games.

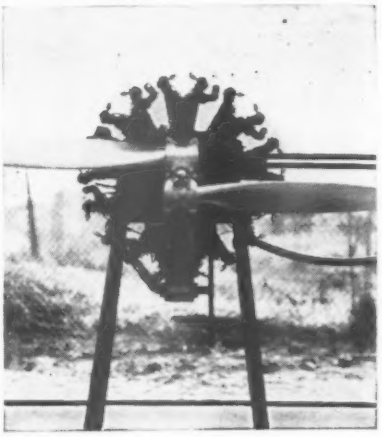
The Gladiator is a development of the Gauntlet fighter and is powered by a Bristol "Mercury" engine. For this particular type of airplane, the Gladiator's performance is exceptional. Top speed is 255 m.p.h. at 14,500 ft. Stalling speed is 63 m.p.h. The ship climbs approximately 2,500 f.p.m. and can climb to 10,000 ft. in 4.1 mins. Service ceiling is 32,800 ft.

Four machine guns are carried on this fighter; two firing down troughs on either side of the engine and two mounted on the underside of the lower wing.



The beginning of a power dive.

A "Double Thread" Propeller



The Maynard-Di Cesare propeller on the test stand.

HIGHER cruising speeds, reduced propeller vibration, lower engine temperatures with resultant lubrication economies as well as a 10 per cent increase in air speed and climb; all these are claimed for the novel Maynard-Di Cesare propeller shown above.

According to Pierino Di Cesare, former World War airman and a lieutenant in the Army Air Corps who designed the new all-metal propeller, the practice of off-setting the blades at the hub gives the propeller a decided arc which, in turn, tends to bring the point of the "propeller fatigue" four inches closer to the hub.

Actual tests on a Wright-powered Travelair, a LeBlond-powered Rearwin Sportster and a Lambert-powered Monocoupe all have shown the propeller to give a more efficient "bite" than ordinary propellers, thereby increasing the airplanes' performances.

The Maynard-Di Cesare propellers, manufactured in Milwaukee, Wis., are scheduled to go on the commercial market July 1.

Whew! What a Pet!

MEMBERS of the utility unit of the U. S. Navy fleet air base at Coco Solo, C. Z., have built up quite a name for their outfit by being the possessors of one of the most astonishing collections of pets in the navy. There's a cat, two dogs —and now a four-foot boa constrictor. The latter joined the pet-loving airmen only recently.

A ground-crew man was working on an airplane one day recently and went to a drawer in the work bench for some tools. But he only opened the drawer a short distance before leaping backward in fright. There, cuddled up but angry for being disturbed, lay the four-foot snake of a brand which is treated with a great deal of respect down in the Canal Zone. But, instead of obeying that first instinct and ridding the immediate vicinity of the danger, members of the squadron cheerfully installed the boa as the latest addition to its already-large menagerie.

The NATIONAL AIR BOARD Says—

Unbiased Opinion to Further National Aeronautics

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ALEXANDER KLEMIN, CHAIRMAN

MR. GROVER WHALEN, President of the New York World's Fair, has honored the Air Board by requesting its suggestions for the Aviation Section of the Exposition. In its desire to be of maximum service in the matter, the Air Board devoted its entire twelfth meeting to aviation at the Fair.

To start the discussion a number of well informed and distinguished guests had been invited: William G. Morrissey, Director of Exhibits and Concessions of the Fair; Montague V. Little, of its Transport Section; Donald D. Cooke, Seaplane Base Adviser to the Bureau of Air Commerce; Beckwith Havens of Fairchild Airplanes, one whose hobby is water flying. It was felt that these gentlemen could give the Board essential basic information.

AVIATION SECTION FAILURE AT CHICAGO

Aviation at the Fair needs all the more careful planning because at the Chicago Fair, in many ways a tremendous success, the Aviation Section was a complete failure, with the minimum public interest in its exhibits and the minimum of public attendance. In view of the public interest in flying and its immense potentialities, such a failure should certainly not be repeated in New York.

AN UNDERTAKING ON AN IMMENSE SCALE

Mr. Morrissey's opening address convinced the Air Board that this undertaking will be on an immense scale and of truly national importance. The accompanying aerial photograph, taken from a plane flying a mile above Flushing Meadow Park, Queens, where grading and lagoon-dredging operations are being completed, gives a fine idea of the site and its relationship to the whole city of New York.

The actual site is indicated by the heavy dotted white line. To the northwest is the George Washington bridge across the Hudson, while at the extreme left is the Triborough bridge from Manhattan and the Bronx. Various other great arteries of travel to the Fair grounds are also seen. The arrow at the extreme right points to the proposed Whitestone bridge to the Bronx, which is to be completed in time for the Exposition.

Indicated in the upper half of the grounds is the Theme Center about which the exhibit buildings will be concentrated. The first Fair buildings will begin to rise this summer.

The second photograph shows a true-scale model of the Fair which is now on display at the Empire State Building, enhanced and beautified in all its coloring by the employment of mercury vacuum tubes and other luminous effects.

The lighting features used in this model, never employed hitherto in this way, show the Fair as it will be seen not only in sunlight but at night, with faithful simulation of the illumination and brilliant color which are to be marked features of this world exposition.

The photograph shows a view looking up the central esplanade towards the Theme Building, the gigantic Perisphere, a sphere of 200-foot diameter, and its attendant Trylon, a needle reaching 700 feet into the air. The Perisphere and the Trylon form the dominant architectural group of the Exposition.

STARTLING STATISTICS

At the Chicago Fair the first year's attendance was 22,900,000. The second year's attendance was 16,300,000. For the New

Looking up the Esplanade of the 1939 New York World's Fair.

York World's Fair a total attendance of 50,000,000 in one year is expected, with a daily maximum of 800,000 visitors and a daily average of 250,000 visitors. The site will occupy 1,216½ acres. Estimated cost by city and state and nearby permanent improvements by government, exhibitors and concessionaires and by the Fair Corporation will reach the stupendous sum of $125,000,000.

GENERAL CLASSIFICATION OF THE FAIR

Mr. Morrissey told us that the Fair would have as its dominant keynote, visualization of the world of tomorrow. There will be five broad classifications: Industry; Shelter; Food; Welfare, and last but not least, Transportation.

It is of course in the Transportation Section that the aviation exhibits will be located. The Transportation Section will cover the latest developments in streamlined trains, and the most modern work in marine transportation. The automotive industry is taking the greatest interest and may be responsible for a number of individual exhibit buildings.

With regard to aviation, nothing quite definite has as yet been decided on. Under the direction of the well known industrial designer, Mr. Raymond Loewy, a special building is being studied for the Aviation Section. What the building will look like exactly, and what will be housed within the aviation building, is still open.

SOME TENTATIVE AVIATION PLANS

Mr. Little spoke with regard to the actual aviation exhibit, which is still in a somewhat embryonic stage. There is likely to be first of all an aviation pageant, starting with a representation of the legend of Daedalus and Icarus; Roger Bacon; Da Vinci; the Wright brothers; other historical landmarks, and ending up with a projection of the future. There will be a paid exhibit section in which static exhibits will be grouped. The Aeronautical Chamber of Commerce of America and the Air Transport Association of America are both cooperating.

In all probability, the World's Fair will be designated as The 1939 National Aircraft Show. An advisory committee of nationally known figures in aviation is being appointed. There will be many exhibits of historical planes and engines. A true representation of naval, military and civil aviation as it exists today will also be attempted.

Consideration has been given to the placing of an aircraft beacon on top of the Trylon. Howard Hughes, the famous racing pilot and builder, will advise as to air races and meets. There will be races to celebrate the opening of the Fair, and other races and meets to commemorate famous aeronautical anniversaries. Mr. Little made it quite clear that suggestions from the Board would be welcome.

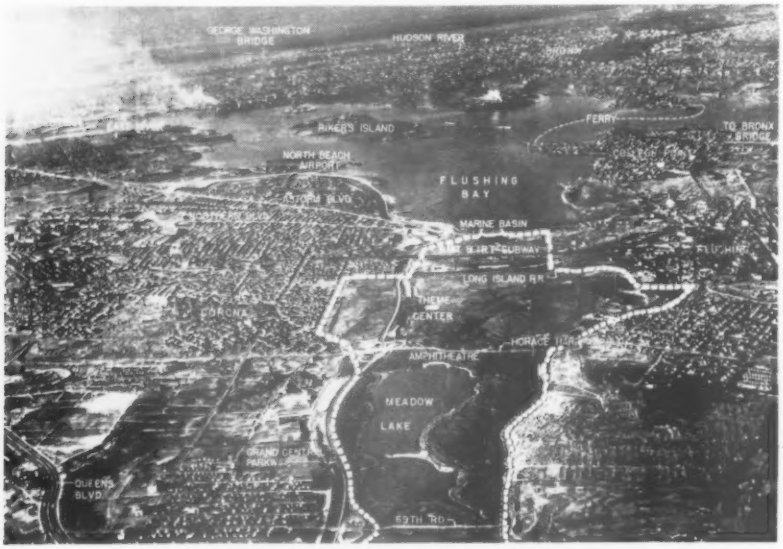
SEAPLANE ASPECTS OF THE FAIR

Mr. Cook and Mr. Havens lead a lively discussion on the seaplane angles of the Exposition. Our readers will note from the plan that the Fair is not too far from North Beach airport whose extension at much expense has been recently approved by New York City.

It appeared from the discussion that while this seaplane is to serve as the New York terminal of Pan American, yet being a city undertaking, certain facilities must obviously be reserved to transient fliers. Mr. Havens was of the opinion that this was a splendid opportunity for a fine permanent seaplane base and that if it could be tied up with highways and other methods of transportation it would be a fine addition to New York's flying facilities.

Mr. Cook thought the Fair was a grand opportunity to advertise water flying, whose full possibilities were so far from being realized in the United States. Mr. Cook thought that water flying should be

(*Continued on page 66*)



The dotted line outlines the New York World's Fair grounds.

The Reynolds Number
by HAROLD GIBBONS

THE Reynolds Number as a function of the correct equation for the resistance created by a solid moving through a real fluid is not really a complicated function.

The complete equation for the resistance encountered by a solid moving through a fluid is

$$\text{Resistance} = f\left[\left(\frac{VL}{v}\right), \left(\frac{v}{V}\right)\right]\left[\rho SV^2\right]$$

$\frac{VL}{v}$ is the Reynolds Number

$\frac{v}{V}$ is the ratio of the rate of speed of a compressive wave in the fluid (standard air) to the celocity, V.

SV^2 is the familiar term where ρ is the mass per unit volume or more commonly, the density of the air. S is the area of the surface of the solid. V^2 is the square of the relative speed between the solid and the air.

The Reynolds Number, $\frac{VL}{v}$, above, is a function of the speed of relative motion between the object and the air, V, a linear dimension of the body, L, and the kinematic viscosity, V, which is the ratio of the absolute coefficient of viscosity to ρ as defined above.

In a wind-tunnel tests on model airfoils the speed and scale effects are such that the values of the lift and drag coefficients of the model are not the same as those actually obtained with the full-size airplane wing.

Therefore, in classifying the data on the airfoil by the VL of the test, which is the product of the velocity in feet per second times the chord of the model in feet, only an approximate value is arrived at whereas the values may vary several percent in the flight test of the full-size airplane.

In this country, the wind-tunnel tests are usually made on airfoil models of 30″x5″, 36″x6″, or 48″x8″, the chord seldom exceeding 12 inches. It is to be noted that all airfoil models tested at McCook field, the N.A.C.A., and the American universities have an aspect ratio of 6 while those tested in some foreign countries such as the tunnel at Gottingen have an aspect ratio of 5. The air speeds vary from 30 m.p.h. for low-power tunnels to 125 m.p.h. for the high-power tunnels.

The VL, therefore, would range from approximately 10 to 180. In standard air a typical airfoil model with a 12″ chord will have a R.N. of about 1,000,000. Authorities agree, however, that full-scale values are between 1,500,000 and 15,000,000.

If the density of the air in the wind tunnel could be sufficiently increased, it is believed that the coefficients would be the same as on full-size models. This theory is based on the relation:

(*Concluded on page 59*)

Why Keep Restricting Amateurs?

by LESLIE LONG

Federal and state licensing authorities have strangled the "back yard" airplane builder consistently until today these young men sneak around guiltily as though their ability were a crime. Oregon, however, has other ideas not quite so mercenary.

AMATEUR aviation has fallen upon evil days and we might as well admit it. Each passing year sees more and more restrictions and fewer and fewer active members of the old crowd that worked so mightily to make aviation what it is.

During the past ten years, something that was fine and typically American has been brow beaten and dragged down to practical extinction. In 1927 you could find men and boys in every village who were putting every spare moment to the planning and building of light airplanes. One dealer alone was reported to have sold more than 2,000 light plane kits. The buyers of these kits were happy with them and they did no harm and much good.

But look at 1937! An estimated sale of 200—not 2,000—such kits would be much too high. Gone with the wind are the good old days, and while we don't like to we have to admit it.

The reason? Well, there are several of them. First came the depression. It had its way in slowing things up, but it did not destroy our spirits, our hopes nor our plans. It simply postponed them. Bad enough as that was, it was but a trifle as compared to the two great blights that next struck us.

First came Big Business, and right on its heels came Big Bureaucracy. In reality the two were (and are) practically one and the same thing so far as we are concerned. Each alone is bad enough, but together they are deadly to anything they oppose.

Big Business was afraid we would ruin public confidence with our bed-slat ships: that we would monopolize public airports and get run into by air liners. Big Officialdom of course agreed with them and began laying down the law. To make sure they were "right" they went even farther than they had been asked to.

Rules were issued, laws passed, legislatures tampered with and propaganda spread. The results were of course immediate and far reaching. State after state began taking up where the Federal government was forced to leave off and in no time at all the thing was done.

As it stands today, the situation at first glance looks hopeless. Any high-school boy who dares to tinker with a lightplane is hunted down like a bank robber. The very same group that made the airplane possible, and that put America years ahead of the rest of the world in aircraft development, is now rated right along with public enemy No. 1. Isn't that nice?

The New Deal that has helped so many others has handed us a stacked deck. Thousands of boys who would now be down in the basement making up a set of Clark Y ribs are out on the roads, trying to wrap Dad's sedan around a telegraph pole. Other thousands who would be making application at flying schools are giving the password at night clubs.

Many a young man has revelled in the building of a brain-child like that shown above. But "legislators" have sent the air-minded youth skulking to out-of-the-way clearings to test-hop small aircraft that generally are remarkably fine machines. Hundreds of others, meanwhile, have done what the law-makers and other interests hoped they would do. They quit and turned to other hobbies.

Dark as it looks, though, the situation is not entirely hopeless. The old spirit of adventure and progress doesn't die so easily and you have but to look at the pages of this magazine to realize that ambition and genius still live. So long as there is life there is hope and it is the purpose of this sketch to show in which direction hope lies.

To the best of this writer's knowledge, about 75 per cent of the states have laws that are entirely restrictive. These laws are much alike and are more or less based on the notorious, so-called "Uniform State Flying Law," which is a mixture of cyanide and dumdum bullets so far as amateur progress is concerned. A few states have no outright laws.

They do about as they please with the amateurs and it is generally the wrong thing. The only state with a full-fledged law that gives the amateur his rights and liberties as an American citizen is our own Oregon. Like a Statue of Liberty it stands pointing the way to better things and better times.

Surely it is logical to think that if one state can do all that, other states can do the same. The "Oregon Plan" works here, so why not elsewhere? It is with that thought in mind that the following outline of how, why and when it was done, is given.

Following the World War there was considerable discussion of some sort of state control of aviation. This finally resulted in the organization of the Oregon State Board of Aeronautics in the year 1921, it being, incidentally, the first board in the United States to actively regulate aviation. The original purpose of the board was to license and control all pilots and aircraft operating within the state.

The original aircraft and pilot's licenses were the only commercial licenses in existence at the time. They were the first licenses to be held and prized by such noted pilots as "Tex" Rankin, Al French, Art McKenzie, Al Davis and scores of others. Many of Alaska's great pilots, such as Bill Graham, Hens Mirow, Estol Coll and others, started for the North with an Oregon license in their pockets.

The original board was made up of five members and at first one of the qualifications necessary was that the member be an Army or Navy Reserve Corps officer. This was soon changed so that membership was made up of Reserve officers and civilian pilots. For several years the members of the board inspected and licensed the pilots and aircraft. In 1931 the law was considerably amended. A one-cent-per-gallon tax was levied on aviation gasoline and the board was authorized to employ a full-time inspector to do the actual inspection work.

The first inspector so chosen was Art McKenzie, but due to ill health he was

forced to resign after three months' service. He was succeeded by Major Howard C. French, who served until he resigned in 1935. He was in turn succeeded by Allan D. Greenwood, the present inspector. It is a real pleasure to state that all of these men have given their best to the office. Without them we could hardly have gone so far.

The original law has been many times amended. One of the major changes was that the state no longer issues commercial licenses. It cooperates with the Federal government to the extent of recognizing only Federal licenses for commercial flying, and this is as it should be. In all ways the state has fostered the growth of true amateur aviation. There is very little red tape about licensing. A plane must be inspected while under construction.

After finishing, if it flies to the satisfaction of the inspector it is licensed. An unusual feature is that while the inspector has the authority to impound any aircraft which he feels is not airworthy, the owner in turn has the right to appeal to the board for a reversal of judgment.

The safety record under this form of regulation has been exceptionally good. During all these sixteen years there has been but one fatality, and that was largely due to infraction of the law.

That statement is surely highly significant. All the talk and propaganda that amateur aircraft were not, and could not be safe is refuted by official record of long standing. Hundreds of airplanes have been built and rebuilt by men with no special training, no academic background, no subsidized technical aid, but none the less, there are few if any, commercial records that can compare with it.

Too much emphasis cannot be placed on this fact. Amateur construction and flying of aircraft has been placed under official observation and has passed the test with flying colors. No amount of biased argument can ever alter that fact.

At the present time a fee of $10 is charged for an aircraft license, to which no one objects. It is worth it. The pilot license is $5. Two grades of pilots' licenses are issued, student and private. The private is practically identical with the Federal type. The student's license is also much the same, but there is also issued a sort of "solo" license which is granted on presentation of an affidavit proving that the applicant has had at least five hours of solo flying.

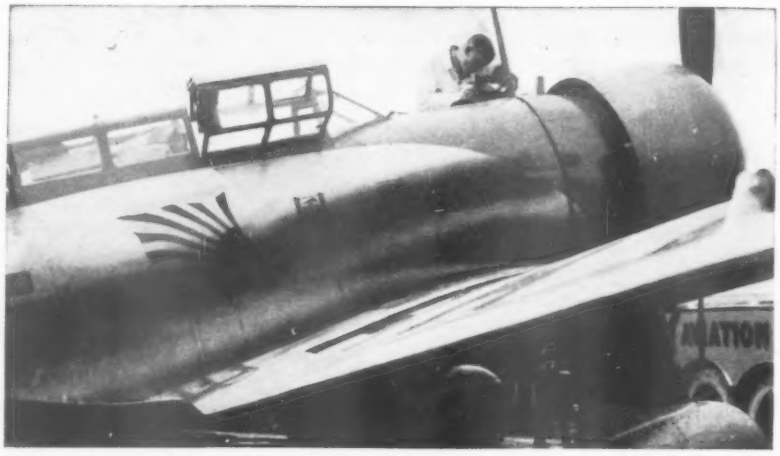
The board hopes that in the near future all charges for licenses can be eliminated. The entire mechanism of the board operates smoothly and without friction anywhere. Board members are appointed by the governor of the state.

At this writing the board consists of the following men: Dr. Raymond R. Staub (chairman), Portland; Webster A. Jones (secretary), Portland; Wm. H. Turner (treasurer), Portland; Arthur W. Whitaker, Portland; Dr. Paul W. Sharp, Klamath Falls; Allan D. Greenwood (inspector) Portland. All the board members are prominent professional and business men.

(*Concluded on page 71*)

Japanese Airmen Set New Tokio-Paris Record

by R. C. WOOD



French mechanics refuel the "Divine Wind" as it prepares for the final lap in the record-breaking flight.

ESCORTED by a squadron of French pursuit planes that had gone out to meet them, the Japanese airmen, Masaaki Ihinuma, pilot, and Kenji Tsukagoshi, radio operator-navigator, landed their plane, "The Kamikaze" (Divine Wind) at Le Bourget airport Friday, April 9th, at 14:35 o'clock, Paris time.

They covered the 15,000 kms. (9,400 miles), Tokio-Paris, in 92 hrs. 17 mins., which establishes a new record for that flight. The aviators were welcomed by a large and enthusiastic crowd, comprising numbers of their own countrymen and numerous French aeronautical personalities. It was the first time that a Japanese plane had landed at Le Bourget airport and it naturally attracted a great deal of attention.

After a short stop of 47 minutes duration, consumed in refuelling their plane and in attending an informal luncheon offered them by the Air Ministry in an adjoining hangar, the airmen took off and flew to London, 225 miles (375 kms.) in one hour and nine minutes. They thus also established a Tokio-London record, 15,300 kms. (9,600 miles) in 94 hrs. 13 mins.

This flight will certainly be recorded as one of the great aeronautical achievements of the year.

Ihinuma and Tsukagoshi had laid out a carefully prepared schedule and rigorously adhered to it. They rested 10 to 12 or more hours each night and flew on an average of about 2,500 miles during the day.

Their schedule was as follows:

First Day—April 5-6th

Tokio. Took off 17 hr. 12 (GMT time) 1,394 miles (2,230 kms.) in 7 hrs. 2 mins.

Taihoku. Arrived 0 hr. 14 min. Left 1 hr. 19 min. 1,112 miles (1,780 kms.) in 6 hrs. 6 mins.

Hanoi. Arrived 7 hr. 25 mins. Left 8 hr. 40 mins. 312 miles (500 kms.) in 2 hrs. 10 mins.

(*Concluded on page 56*)

An admiring countryman yells his congratulations to Pilot Ihinuma just after the record-breaking flight ends at Le Bourget airport, Paris.

"....Clear and Unlimited"

by SWANEE TAYLOR

Hold your hats, folks. Our vigorous commentator on aviation's innumerable byways has a bone to pick. And does he pick it!

APRIL 17, 1937
COL. JAMES MONROE JOHNSON
ASST. SECRETARY OF COMMERCE
WASHINGTON, D. C.
AM WIRING A VIGOROUS PROTEST TO THE NATIONAL AERONAUTIC ASSOCIATION PROTESTING THEIR UNWARRANTED COMMA AND UTTERLY UNAMERICAN INTERFERENCE WITH THE PROPOSED TRANSATLANTIC AIR RACE STOP WHY IS YOUR BUREAU MEDDLING AGAIN QUERY HASNT THE BUREAU OF AIR COMMERCE SATISFIED AN APPARENT LUST TO BUNGLE AND BLUNDER QUERY YOUR BUREAU CONTINUES TO SHOW A LACK OF FUNDAMENTAL KNOWLEDGE OF AVIATION IN GENERAL AND AIR SAFETY IN PARTICULAR STOP IF THE ATLANTIC IS UNSAFE TO FLY WHY ALLOW PAN AMERICAN AIRWAYS TO FLY QUERY THE GOVERNMENT OF THIS COUNTRY IS SUPPOSED TO BE THE SERVANT OF THE PEOPLE AND BY THIS I MEAN AN HUMBLE SERVANT STOP YOUR DEPARTMENTS ATTITUDE SEEMS TO STRIVE TO STIFLE AMBITION IN AMERICAN YOUTH STOP MORES THE PITY
SWANEE TAYLOR

Department of Commerce
OFFICE OF THE ASSISTANT SECRETARY
Washington.
April 20, 1937

Mr. Swanee Taylor
Popular Aviation
New York City.
Dear Mr. Taylor:

Relative to your radiogram of April 17, I should like to state that at all times it is our desire to be servants of the American people and remain humble in our attitude, but perhaps not as humble as you would wish us to be.

In this particular instance we consulted every available aviation interest before expressing an opinion and decided upon our present course of action upon due deliberation and what we considered to be the best interests for the furtherance of American aviation.

Cordially yours
(Signed) J. M. Johnson,
Assistant Secretary of Commerce.

* * *

The above flurry of correspondence took place when the dear NAA protested, at the D of C's instance, against the Lindbergh Memorial Race. A pretty zippy wire was sent at the same time to NAA listing, "My protest and complete lack of respect at your becoming a catspaw for the Bureau of Air Commerce in this trans-Atlantic race matter".

The contrast in tone of the reply I received from the president of the National Aeronautic Ass'n and the one printed above was, well, to be generous about it, quite great. In a calm, gentlemanly manner Mr. Horner explained that the government's (the people's?) request for interference had been put to vote in his organization, and it was a case of majority rule. There had been, he added, a considerable dissenting voice.

Beneath this smile lies the determined conviction that the trans-Atlantic air race must go on.

For some reason I can't help but believe that opposition to the race originated and was nurtured in the bosom of Pan-American Airways, the great aerial octopus which seeks hungrily to stretch a tentacled arm over each of the seven seas. In the eighth arm, of course, we see waving so proudly the Red-White-and-Blue.

Perhaps I'm wrong in this belief. Surely Pan-Am wouldn't risk stirring up any excitement which might get somebody sore. It would be just like some sorehead to focus public attention on the fact that each time a *China Clipper* flies across the tiresome Pacific we, the people, pay $16,000 for the hop.

(*Ed. Note: For the first* 101 *round-trips the Post Office Department handed over if you please* $3,232,000 *for this shuttle service accommodating principally Big Business in the Orient. National Defense insurance?? Tck, tck, the Navy flies whole squadrons to Hawaii as a matter of routine operations. American Commerce?? Goshamighty, those people out there don't even have shoes!*)

No, Pan-American couldn't have thrown the brick-bat, not even from their terribly effective publicity ambuscade. As usual, I'm wrong as usual. However, it doesn't matter any more as the race is back on again. You see, Col. Johnson overlooked one or two important interests when he settled upon that "present course of action".

Among those he neglected was Senator Morris (Non-Alcoholic) Sheppard, (Tex. D), an air enthusiast of reknown who suddenly developed a warm and expert opinion when Jimmy Mattern entered the race. And when any good party regular blows his horn, whether or not he knows what he's blowing about, even sub-Cabinet members whinny gracefully and trot right into line.

All of which is a condition for you younger voters to ponder. We old fogies are too inured to the meanness of man; a bit too punch-drunk from the brutal Washingtonian rabbit-punches. But you still can snatch our beloved Aviation from the paws of politics, and in so doing keep one enterprise in this world clean and honest.

Luftshiff Hindenburg . . .

By the time you get this issue of your favorite air magazine the boards of investigation which sat on the *Hindenburg* disaster will have been long since disbanded and the whole thing forgotten, save by a certain bereaved few. Yet while the horror is still fresh, while all sorts of views are being aired and nothing officially done so far, I'm going to dip in my personal oar.

From where I sat—in the movies—it looked to me like my old stand-by, pilot error, had a prominent place in the sad affair. Honest, folks, it was a lousy landing. But let's go through it step by step. Remember, though, this isn't a one man board of inquiry; I'm merely advancing a theory—a columnistic prerogative—which may or may not be brought forward officially.

First off, the ship came down in a crabbing turn. All the motors, as plainly shown in the pictures, were functioning; they were alternately gunned or throttled in the process of getting the nose down. There must have been some difficulty in accomplishing this for considerable water-ballast was dumped, aft, to lighten the tail. Newspaper reports indicate that the landing, when finally effected, was slightly cross-wind. Remember these facts, an unbalanced ship and cross-wind position, for they have great bearing on my theory of abnormal structural strain.

Evidently the pilot came in too fast for the ground crew. One report has it that he called for the handling guys to be released so that he could go around again and shoot another landing. At any rate, still photographs show the starboard bowline being held taut, while the port line had been released. Something else to consider when you think about structural twist and strain.

Now, this twist, a sort that could

never be imposed while flying, might very well be sufficiently great to cause metal fracture—a minor tie-rod or another piece not calculated to withstand undue stress. And when metal breaks it gives off a tiny static spark. Else the bend might have brought metal parts close enough together to cause a static jump.

Another thing you may do well to discount completely is the charge that America is wholly at fault because we have all the helium in the world—our national greed. Well, greed enters into it all right, but not the Yankee brand. To be more specific, the mouthy Boake Carter will no doubt be surpised to hear that the *Hindenburg* was designed for helium through the earnest efforts of one W. C. Young, a smart American who sits on the National Air Board and is running the business for Taylorcraft.

Also, that the German government wouldn't use helium because it not only cost too much, in price and in diminished pay-load, but because of their selfish system of exchange. They don't pay cash for anything, you know. Rather they make you take toys, trinkets or sewing machines for whatever you sell them.

The rescue work, as everybody knows, was marvelous to behold. When the cry went up, "Stand Navy" every man-jack turned and tore right back into the holocaust. It was a proud sight to watch those funny little gob hats, atop black rubber slickers, bobbing around in the mouth of the inferno. Commander Rosendahl has every right to brag about the best cock-eyed crew a skipper ever had; theirs was a performance strictly in keeping with the highest traditions of the Naval Service. I hope each one gets a beautiful "bouquet" placed in his service "jacket."

A Lotta Scud . . .

Reliable sources report that about ten months remain for the American Aircraft Industry to cement the Latin-American airplane market or loose it forever. (A Hull lot our State Dept. cares) . . . Mr. W. T. Piper, aviation's Henry Ford, has announced a competition for flying collegians. The five winners will receive a complete training course in aeronautics and a Cub. (Smartest piece of exploitation in the history of aviation) . . . Passing thought: It was the transcontinental racing of Frank Hawks, Jimmy Doolittle, Roscoe Turner, Ruth Nichols, et al that made this country speed conscious. Wouldn't it therefore be a good idea to race a few oceans just for the sake of mankind. Better not hold them anywhere near the time of the National Air Races, however, as the Cleveland racket is sooooooo jealous of every line of publicity . . . At last a book on the early days of flying that doesn't get into the Curtiss-Wrights squabble. It is the "Sky Storming Yankee" by Clara Studar. (Stackpole Press. $3.00.) Very meaty reading, and an "Album of American Aeronautics" taken from the per-

(*Concluded on page 60*)

Is There a Future for the Young Airman?

by GEORGE HURST

These were the days! Many an air-minded youth was initiated into the ranks of the full-fledged airman in the old Consolidated PT shown above. This rugged old aerial war horse was standard equipment both in the army and navy. Incidentally, that fire extinguisher on the side of the fuselage did plenty of work not connected with fires.

THE other night I stood (behind the fence) at Municipal Airport at Indianapolis and watched the night passenger plane come in.

The whole field gave the impression of modernity, of big business. The building was of the finest, cement runways stretched smooth and white in the glare of the efficient lighting system, and the ship, a twin engined Douglas, was the last word in aircraft design.

"Well and good," I thought. "The wings of aviation are growing fast and strong. Hopping passengers out of barnlots is fast being relegated to the dim past."

I turned suddenly about and found myself standing close to a young kid of about high school age. The hungry look on his face as he watched the ship and pilots, I shall never forget. It snapped me out of my smugness, out of my elated mood.

What chance did he have of crashing into the flying game? Absolutely none or at the most a very slim chance. True, if his family had enough money to see him through a long period of training he might make good. His clothing although neat, did not give credence to the belief that his clan was rolling in wealth.

Well, then, how about getting into the Army or Naval Flying Service? He stood a chance there *if* he could go on to college and *if* he could pass a rigorous examination. I wouldn't exactly call it the best chance in the world.

No, the kid was held in checkmate. My eyes traveled to the stout wire fence and a prominent "Keep Out" sign. These protective devices did more than keep him in certain restricted limits. They were a symbol. A symbol of the many young people walled out of their chosen profession.

The field, the factories, or the airlines were not at fault. They have reached a point in their development that requires trained men . . . a trained personnel for their operation. As to the restricting signs directed against the wandering public . . . well, one day I saw a middle-aged, self-assertive woman that insisted on trying her muscle in turning the prop of everything in a hangar from a Buhl

(*Concluded on page 73*)

An important part of the fledgling's ground course is radio. Here an instructor is "pounding brass" while students copy him through regulation aviation helmets equipped with earphones.

Looking Back From 1947

by T-2003

Think of this old industry ten years from today. Considering the number of advancements that have been made during the past ten years, there's no telling but what this bit of literary guesswork might be a good guess.

JAY blew (almost literally) into my office that I had rented the year before in 1946, when I had found the business of aerial picnic cruise directing profitable beyond my wildest expectations and had hired Jay and larger office space almost simultaneously. He was enthusiastic over his latest sportplane, which he had just landed on the office building's roof.

"Real visibility at last," he exulted, "and on top of that the slickest speed booster y'ever saw. A thermite rocket tube, good for 2g to 3g acceleration for 20 seconds, with control button on the throttle. Only trouble is, the new model's going to be out in three months, with conserving valve on the rocket tube,—a one-minute tube at that. Take off, give her 10 seconds of boosting to clear some obstruction and shut her off,—you still have 50 seconds worth left. And more new ideas . . ."

"Son, it's all old stuff," I rudely interrupted. "New ideas,—phooey. They're only fool-proof and profitable applications of ideas that are almost as old as you are. The last big new idea was the autogiro. Since then, . . ."

"Y'mean to say this cruise-directing business we're in now isn't something entirely new?"

"Well, back in 1932 or '33 they were running week-end aerial picnic parties in Europe. Those with planes—and believe me, son, in those days not everybody had 'em, either—would fly out in the country, lighting at a previously reconnoitered field suitable for picnicking. Their friends would come along in autos with picnic baskets and tents if they were going to spend the night.

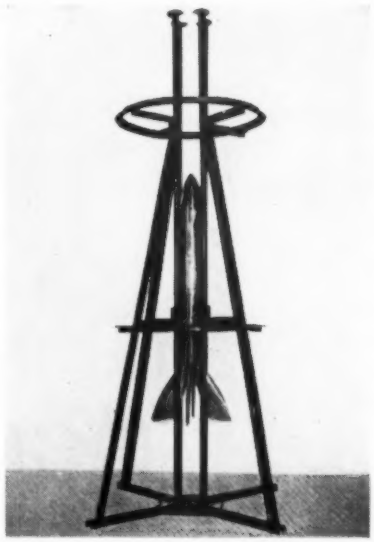
"Small sportplanes in those days took almost as long to be wheeled from the hangar, warmed up, flown 100 miles and landed as it took autos to dash that distance along good roads. Then in 1936-'37 people in this country used to hold winter skiing parties. I was a party director on one New England run. Put the two 10-15 year old ideas together and what have you? Answer—our racket."

"But like I was telling you," came back the unconvinced youngster; "this booster on my Goosebaum Special. Surely that's . . ."

"Old as the hills," I retorted triumphantly. "Take the name of your plane. Who makes it? Kelly and Novak Co. Where do you get 'Goosebaum' out of that? Well, Pete Novak happened to read in an old POPULAR AVIATION, January, 1932, it was, a yarn about some crazy yahoo with a plane he called a 'Goosebaum Special'. It sounded tricky so he adopted it. As for the booster, termite rockets were old in 1930.

"About 1933, the Army Air Corps figured that bombing planes might be equipped with some sort of speed booster to shoot them fast through anti-aircraft defenses or past enemy pursuit formations, also to get them off war-time airdromes, which in those benighted days they thought would be country pastures instead of runway airdromes away back in the interior. Other Air Forces were also working on the same idea. It came to naught."

"But you just mentioned the Army Air Corps," the kid shot back. (One



Who knows but what this gadget may some day replace the street car—or something. They've already tried shooting mail to the moon with one of these rockets.

reason I hired him, he's a persistent cuss; never knows when he's licked.) "Now we had a Department of the Air. That at least is new."

"Listen,—the United States and Japan recently did consolidate their respective air efforts, but did it 15 to 20 years *after* the other major world powers had done the trick. So *that* wasn't a new idea. Now you ask me and I'll answer."

"All right. There's a fellow who's got a new idea for a prop. He's in—"

"I'll bet he's in a sanitarium" (I guessed right). "There's a cycle on that propeller stuff. Back in 1925 to 1927 there was a wave of fire-proofed fabric. No kidding, that was a vital affair in those days. Then in 1929 came a wave of bird-shaped airfoils.

"In 1932 every inventor, real or fancied, had a new idea for a prop, or means for doing away with props. We still have 'em with us, I see. The people who actually got up the idea of controllable pitch propellers weren't broadcasting their ideas until the product was ready for final test."

"You mentioned fire-proofed fabric," Jay cut in. "Did they worry about that stuff in those days?"

"Yes, and they still rivet or shot-weld sheathing plates, don't they? In 1936 the widest steel plate rolling mill rolled 96 or 98-inch plates. In 1945 the largest plate stamped out a dural wing only 15 by 5 feet. They haven't improved much in the last two years either. Sonny, I've seen a lot in the last 30 years or so. But it seems to me I've told you all that stuff before. Maybe . . ."

"No, go on. Tell us some of your experiences in the old days."

I looked around and realized what he meant by "tell *us*". The office staff of stenog, office boy and 2 other contact men besides Jay were knocking off to listen.

"Well," I began, "back in 1939 I was testing out a mass detector. The magnetic and not the visual type. It had four needles, one for each vertical quadrant. I'd fly next to a hill and the needle in that lower quadrant would point out straight in the hill's direction. I flew under a transport and up flew the upper quadrant needles, both of them. The instrument was tuned up pretty high.

"Then, at last, I got within a mile of a large cumulo-nimbus cloud. The needle shot straight at that cloud. Why shouldn't it? There, in the air, was thousands of tons of moisture in one huge ball. That killed that particular idea,—of detecting the presence of sudden obstructions or other airplanes. Fifty thousand dollars had been spent on it and no one had ever figured that clouds also had mass. In other words, in bad weather, with broken cloud formations or irregular formations the instrument wouldn't work properly."

The telephone rang.

It was a group of a half dozen more applicants for the Dunes Park picnic on the following week-end. Yes, amphibians preferred, two groups, one through St. Louis, the other through Toledo, both at 150 m.p.h. to favor the older slower crates. Sure, I'd have the usual towed banner out ahead of each formation if the sky was clear; and a special treat in addition when they arrived at the lake. (I had a new stunt up my sleeve: cooking the picnickers' dinner aloft in an old Douglas, then dropping down on them with a hot, air-cooked meal.

The next stunt would be cooking their dinner in the banner-towing lead plane and broadcasting an odor-by-odor description of same to the aerial picnic formation following, the meal to be ready upon their arrival.)

(*Concluded on page* 58)

Building the B/J P-16 Fighter

by PAUL W. LINDBERG

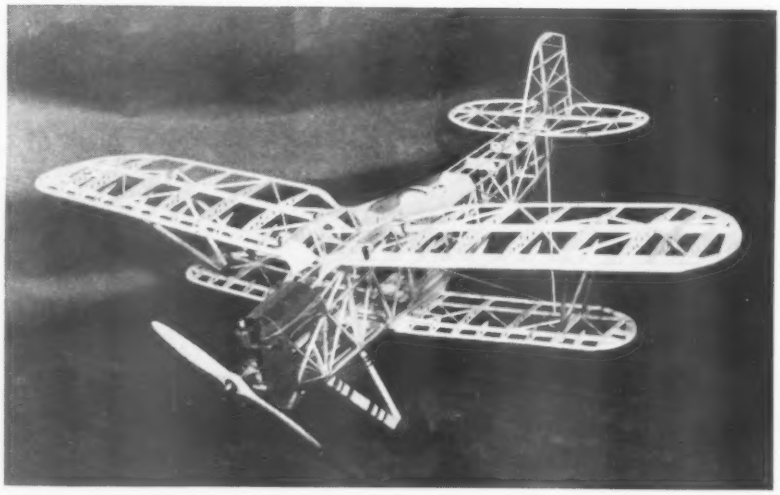
Our model editor completes a difficult design.

AFTER a great deal of experimentation and research work, we have perfected a perfect flying model of the Berliner Joyce U. S. Army pursuit. The flying ability of this model will thrill you as it is an extremely stable flyer. Its high gliding aspect ratio is due to the extra amount of wing area built in a biplane model.

As most gas model enthusiasts have more or less evaded the biplane type, we wish to state that this particular model is perfectly adapted for a gas powered model. Not until after you have built your model and test flown it will you appreciate the wonderful flying characteristics of a biplane.

All the latest improvements in the art of building gas models have been incorporated in this design, such as full shock absorbing landing gear, adjustable tail surfaces, wings that shear off in case of an accident, etc.

Now that we have explained some of the fine points of this model we will study the plan carefully before going into the construction. After you have enlarged your plans, the fuselage is first tackled.



This sturdy model is a worthy counterpart of its big brother.

CONSTRUCTION OF FUSELAGE

Place a sheet of wax paper between the plan and the frame; this is to prevent the frame from sticking to plan. After the two fuselage sides have been constructed the cross members are then inserted. Number 18 by ½-inch wire nails are driven through the longerons into the upright and cross members of the fuselage.

From ⅛-inch sheet balsa, cut the formers and cement at their proper stations. ⅛-inch by $\frac{3}{16}$-inch stringers are now attached at rear of fuselage to form the turtle-back.

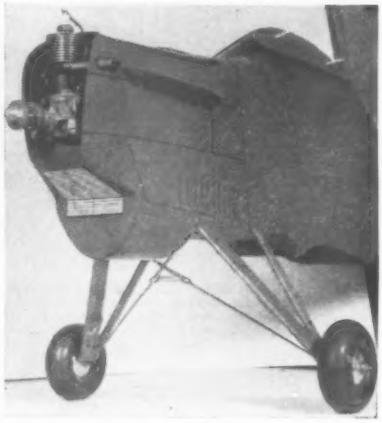
Stiff paper is used to form cockpits. Strengthen the front formers with $\frac{3}{16}$-inch square as shown on the plan. The gull shaped formers which are attached to top of body are made from ⅛-inch sheet balsa. At this point it may seem a little bit difficult to construct but if the plans are studied carefully, no trouble will be encountered here.

Attach ribs A to tips of gull formers. From two soft balsa blocks, carve and sand front fillets of gull to fit properly.

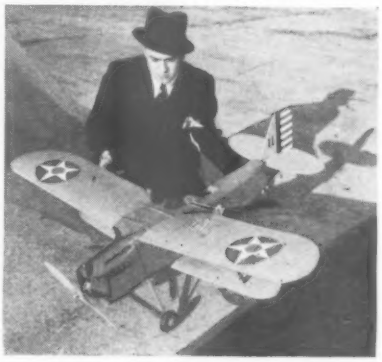
A ⅛-inch three-ply veneer fire wall is attached to front of fuselage. At the bottom of the fuselage and fire wall are attached two ½-inch thick balsa pieces to form radiator.

The motor mounts are made from ¼-inch by ½-inch birch beams which run through fire wall and into fuselage. These in turn are held by ⅛-inch birch dowels.

It is very important that these pieces fit very snugly in order to prevent any vibration. This is a very new and advanced type of motor mount and is very easily replaced if damaged.



How the engine is mounted.



The author and the completed model.

CONSTRUCTION OF LANDING GEAR

The struts are made up from a good grade of bass wood and are streamlined as shown in plan. The axle is one continuous piece which runs up each front strut and across the bottom of fuselage. The rear struts are supported by the smaller gauge wire. All other details are very clearly explained.

CONSTRUCTION OF BATTERY RACK

This type of rack and weight adjustment has been originated and developed by our laboratory and we believe it to be the most efficient form for balancing your model.

ELEVATOR AND RUDDER

Their construction is so simple that very little explaining is necessary. It is imporant that these be constructed upon a flat surface so that they will have no tendency to warp. Small aluminum pieces are wrapped around the balsa at various locations to receive the tail bracing wire.

CONSTRUCTION OF WING PANELS

All ribs are cut from $\frac{3}{32}$-inch sheet balsa. The spars, leading and trailing edges are then cemented into place. Do not omit any of the bracing in between the ribs as this is necessary to strengthen them. $\frac{5}{16}$-inch dowels are cemented to spars at root of wings. Bind these with thread for strength.

The dowels in gull sections of fuselage are cemented in at the same time for proper alignment. After the three sections of the bottom wing are finished, cement them together as shown through front view of wing.

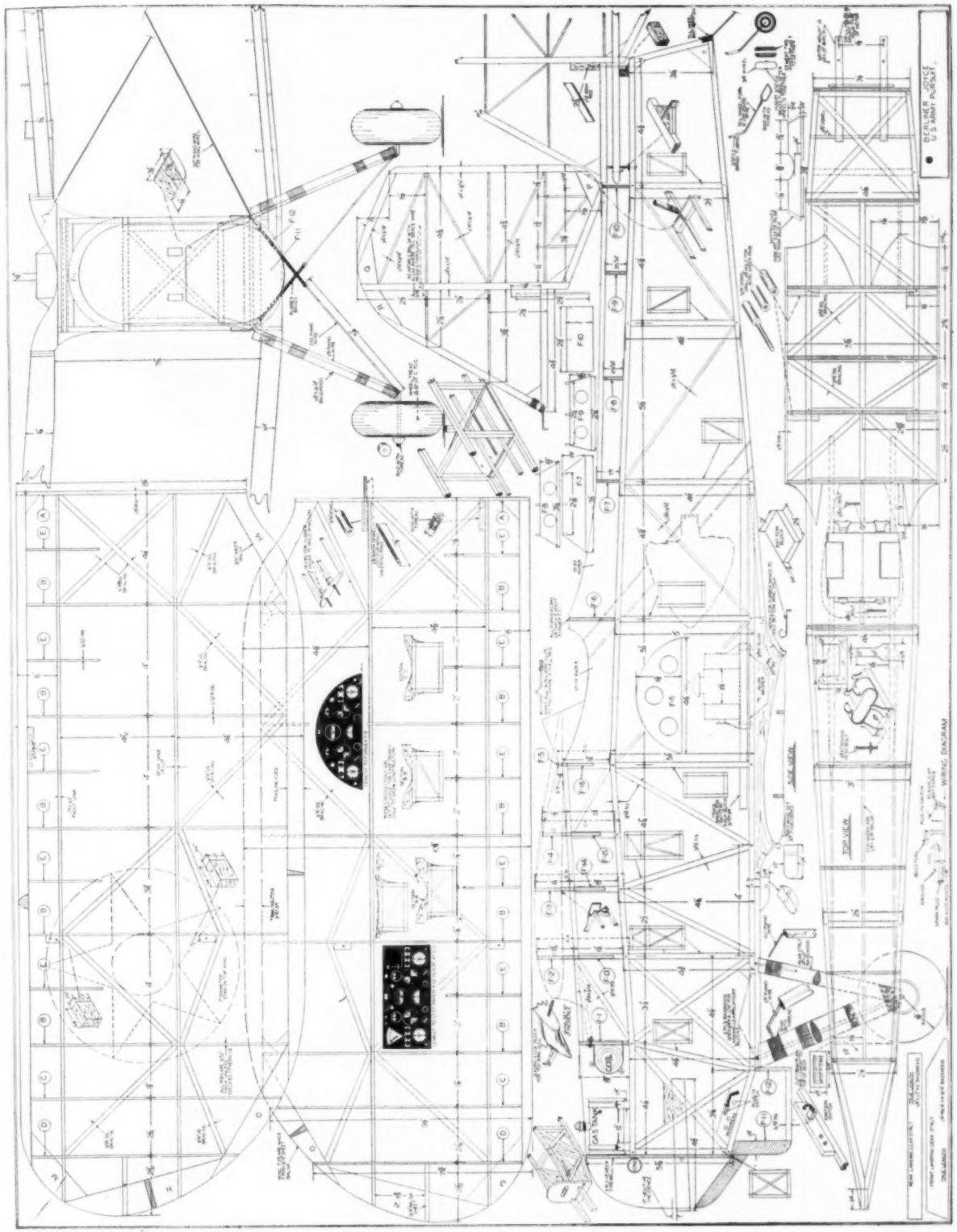
CONSTRUCTION OF WING STRUTS

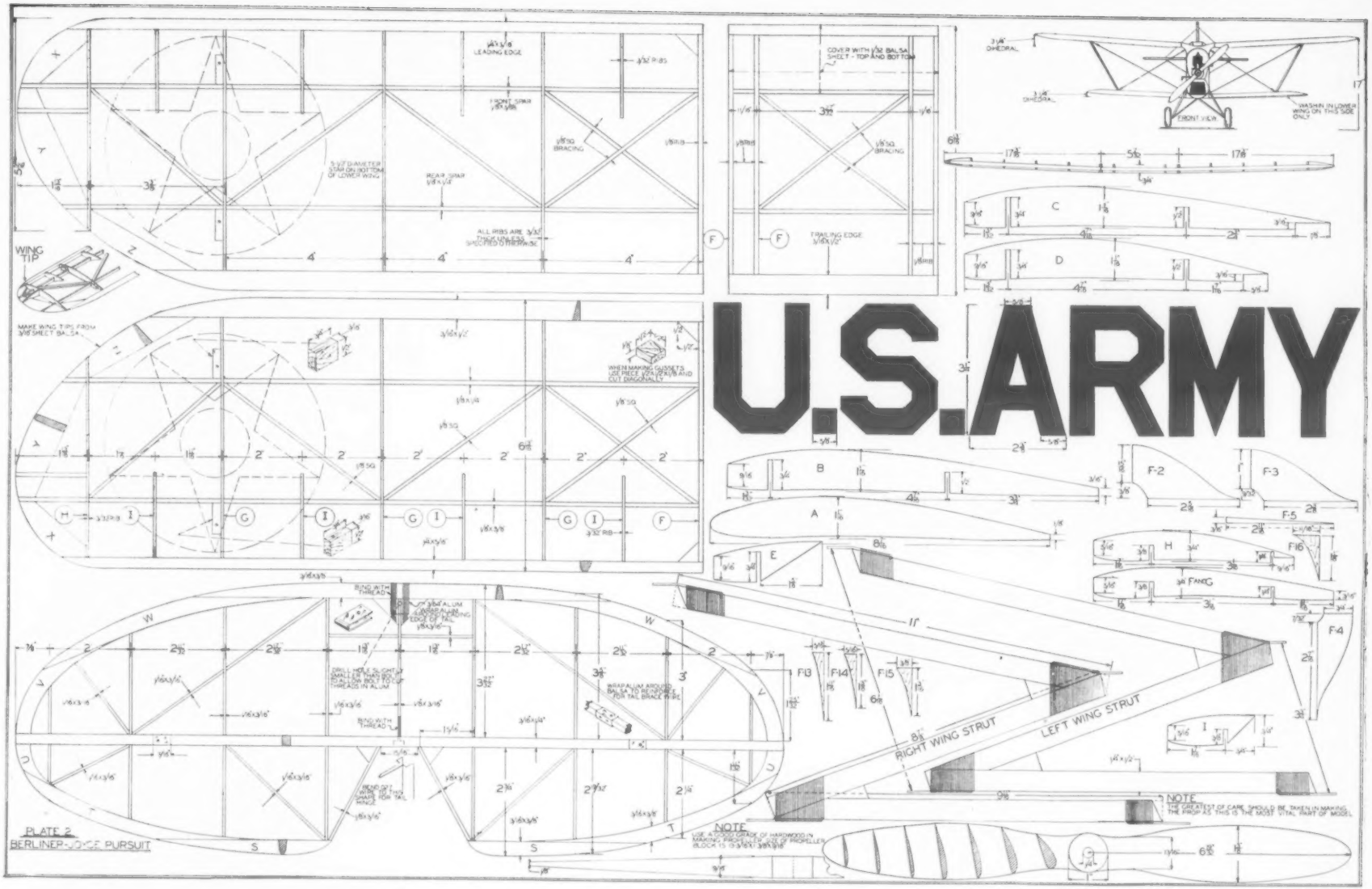
These are made from a tough grade of balsa and great care should be taken so that the left lower wing has a wash-in of

(Concluded on page 62)

Plans of Berliner-Joyce Gas Model

(*Plans Continued on Next Page*)



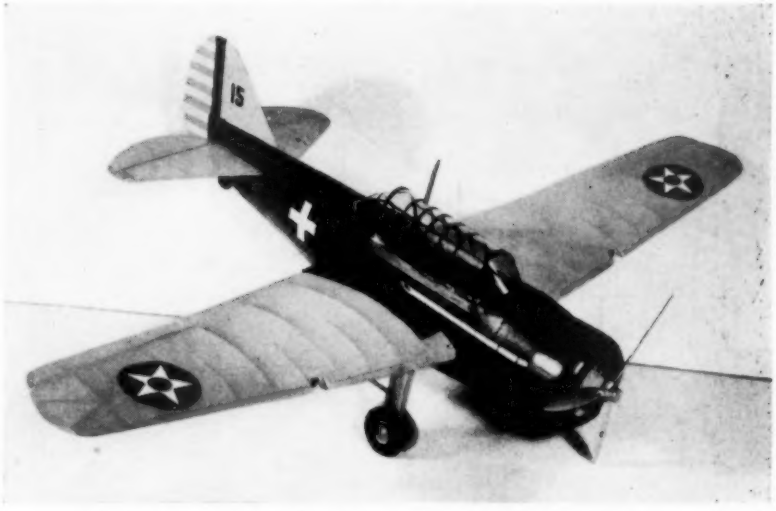

U.S.ARMY
WING TIP
LEADING EDGE
FRONT SPAR
REAR SPAR
ALL RIBS ARE 3/32 THICK UNLESS SPECIFIED OTHERWISE
COVER WITH 1/32 BALSA SHEET - TOP AND BOTTOM
TRAILING EDGE
DIHEDRAL
FRONT V.I.W.
WASHIN IN LOWER WING ON THIS SIDE ONLY
MAKE WING TIPS FROM 3/16 SHEET BALSA
WHEN MAKING GUSSETS USE PIECE 1/64 X 1/8 AND CUT DIAGONALLY
BRACING
RIGHT WING STRUT
LEFT WING STRUT
NOTE
THE GREATEST OF CARE SHOULD BE TAKEN IN MAKING THE PROP AS THIS IS THE MOST VITAL PART OF MODEL
PLATE 2
BERLINER-JOYCE PURSUIT

The North American O-47 Model

by

PAUL W. LINDBERG
POPULAR AVIATION Model Editor

OUR crack Army attack model for this month will thrill you with its long and exciting flights. To make the most of your model, please do not omit any details.



Hard to tell from the real thing, this model is an excellent performer.

COLOR SCHEME

Fuselage—Army Blue.

Wings and tail surfaces—Army Yellow.

Details explained on plan.

CONSTRUCTION OF FUSELAGE

After studying the plan carefully, and you are thoroughly acquainted with details, place a sheet of ordinary wax paper on top of plan to prevent framework from sticking to it.

We suggest that you begin with the fuselage, which is constructed one side at a time. The longerons, vertical and diagonal, etc., are held in place until securely cemented. This is done by insertnig straight pins on either side of the strips.

When the fuselage sides are completed, they are pinned to the top of the plan, in such a manner, that the top longerons face down and the sides are at right angles with the table. The cross members are now cemented in their places, forming a rectangular fuselage.

After formers have been attached to the fuselage, the stringers are cemented into position. These are made from $\frac{1}{2}$-inch by $\frac{1}{16}$-inch balsa, and they are spaced $\frac{1}{4}$-inch apart around entire fuselage.

CONSTRUCTION OF WINGS

This wing is made up of two separate panels. Cut all ribs from $\frac{1}{16}$-inch balsa. Pin the spar in position on the plan. Now, cement the ribs in their proper locations.

The leading and trailing edges are cut and sanded to shape then cemented to the ribs. The panels carry movable ailerons which are a great help in controlling the flights.

Make wing tips from $\frac{1}{8}$-inch balsa. We highly approve of this type wing tip, because it is much easier to construct and neater in appearance.

CONSTRUCTION OF ELEVATOR AND RUDDER

These are made from $\frac{1}{16}$-inch square flat balsa and are cemented on the plan. Their construction is easy, therefore, you should have no difficulty here.

In covering the elevator, it is important that the two units are covered separately; for they are to be inserted in slot at rear of fuselage. The aluminum hinges are inserted after they have been placed in the rear of the fuselage.

CONSTRUCTION OF MOTOR

The cylinders are carved from solid balsa and are wrapped with heavy thread to imitate fins. Push rods, etc., are added.

CONSTRUCTION OF LANDING GEAR STRUTS

Select a tough grade of balsa for landing gear struts. They are reinforced with side truts made from $\frac{1}{8}$-inch dowel. All details are clearly shown on the plan.

COVERING THE MODEL

Do not attempt to cover the model with the framework completely assembled. Cover the wing panels separately as well as other parts. After the framework has been covered, to shrink tissue, apply coat of water.

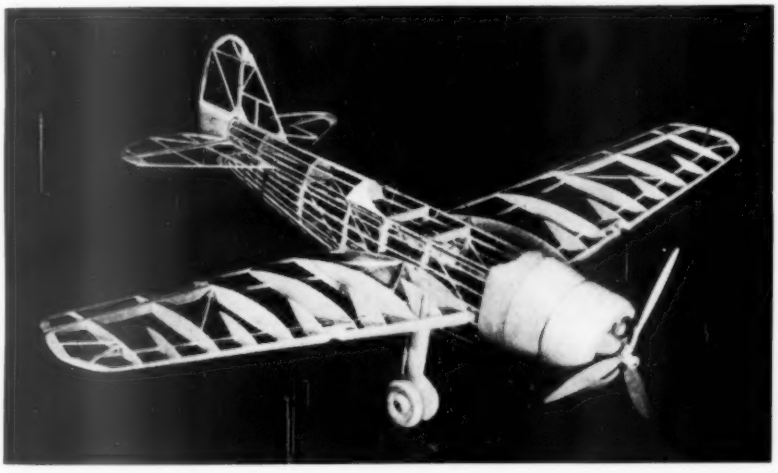
ASSEMBLY

Because this model is a mid-wing design, it is necessary to attach the wing panels to $\frac{1}{8}$-inch by $\frac{1}{4}$-inch balsa beams which pass through the middle of the fuselage. The landing gear struts now are attached, as well as the tail surfaces. The windshield and hood are cemented in position after the model has been completely painted.

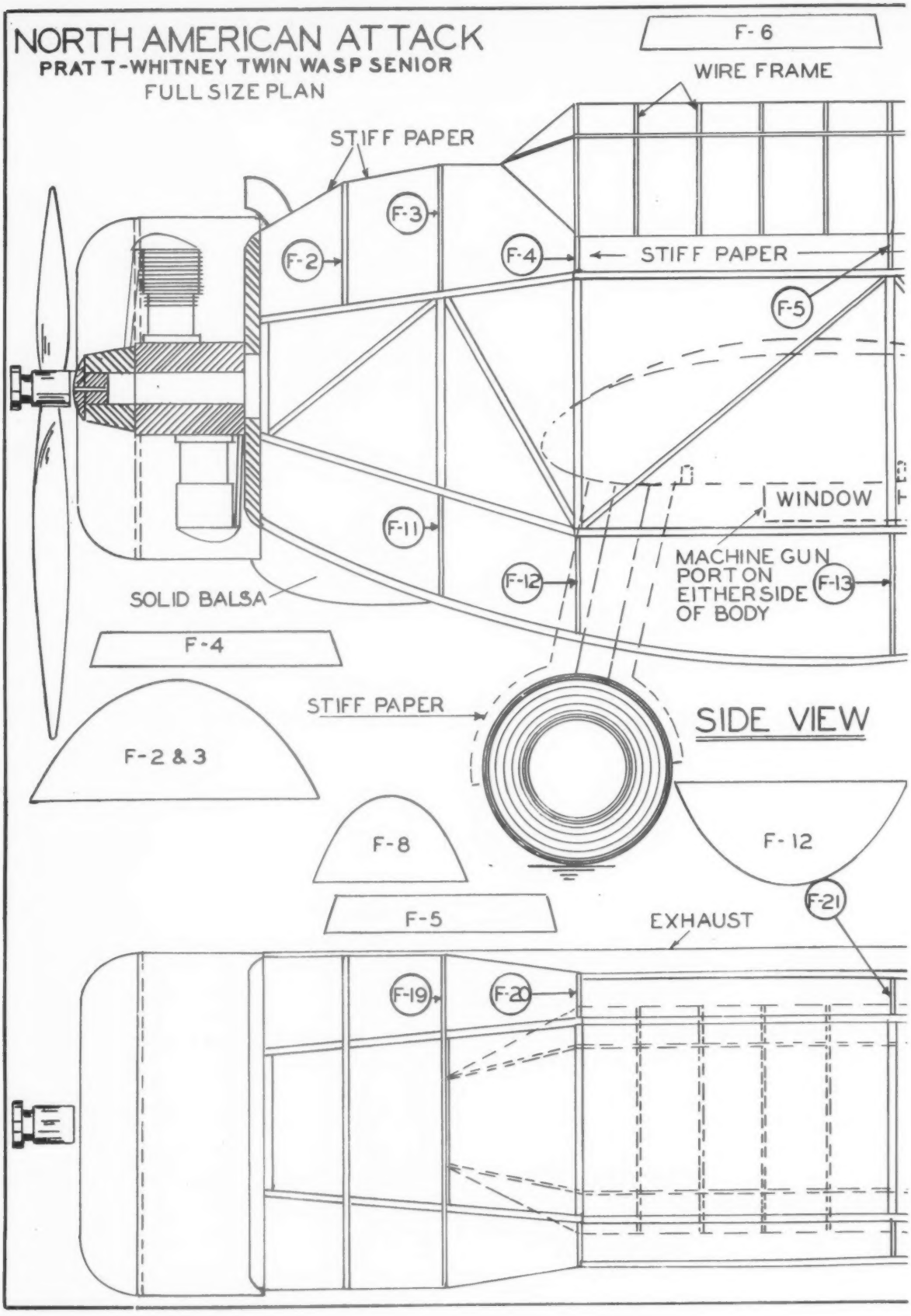
TESTING AND FLYING

Two types of propellers are used on this model. One is made of fiber, which has a much wider blade, causing the rubber motor to turn at less r.p.m., and enabling the model to fly greater distances. By twisting the blades, the pitch can be easily adjusted. The balsa scale propeller is used for exhibition purposes only.

Six strands of $\frac{1}{8}$-inch flat rubber are sufficient to fly the model. With the rubber motor and flying propeller in place, gently launch your model over tall grass to see whether it is properly balanced.



This scene too looks like the real ship in the factory. Ribs, spars, longerons—everything is a small edition of the real thing.


NORTH AMERICAN ATTACK
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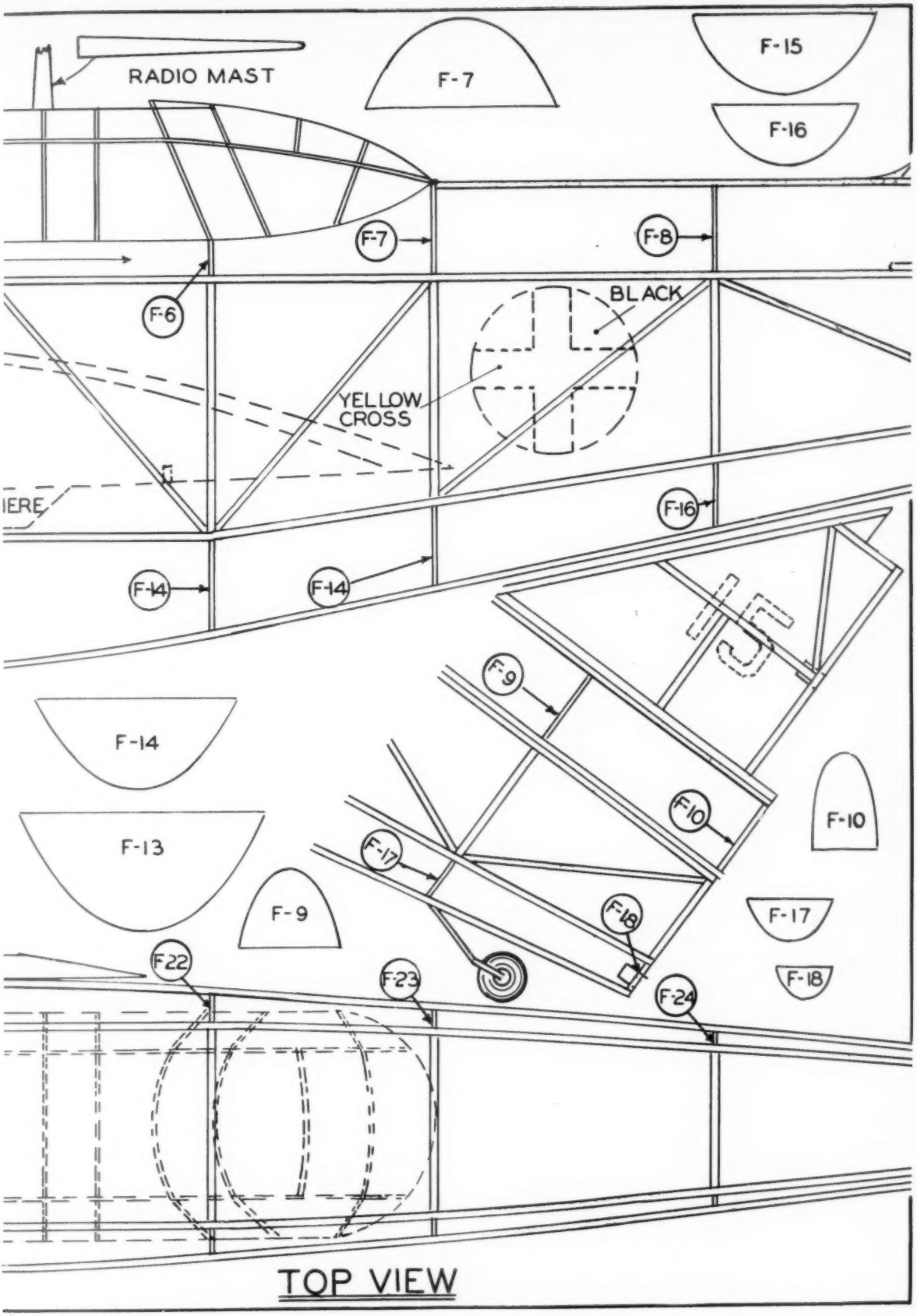
FULL SIZE PLAN
F-6
WIRE FRAME
STIFF PAPER
F-3
F-2
F-4
STIFF PAPER
F-5
WINDOW
F-11
MACHINE GUN PORT ON EITHER SIDE OF BODY
F-12
F-13
SOLID BALSA
F-4
STIFF PAPER
SIDE VIEW
F-2 & 3
F-8
F-12
F-21
F-5
EXHAUST
F-19
F-20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F-9
F-14
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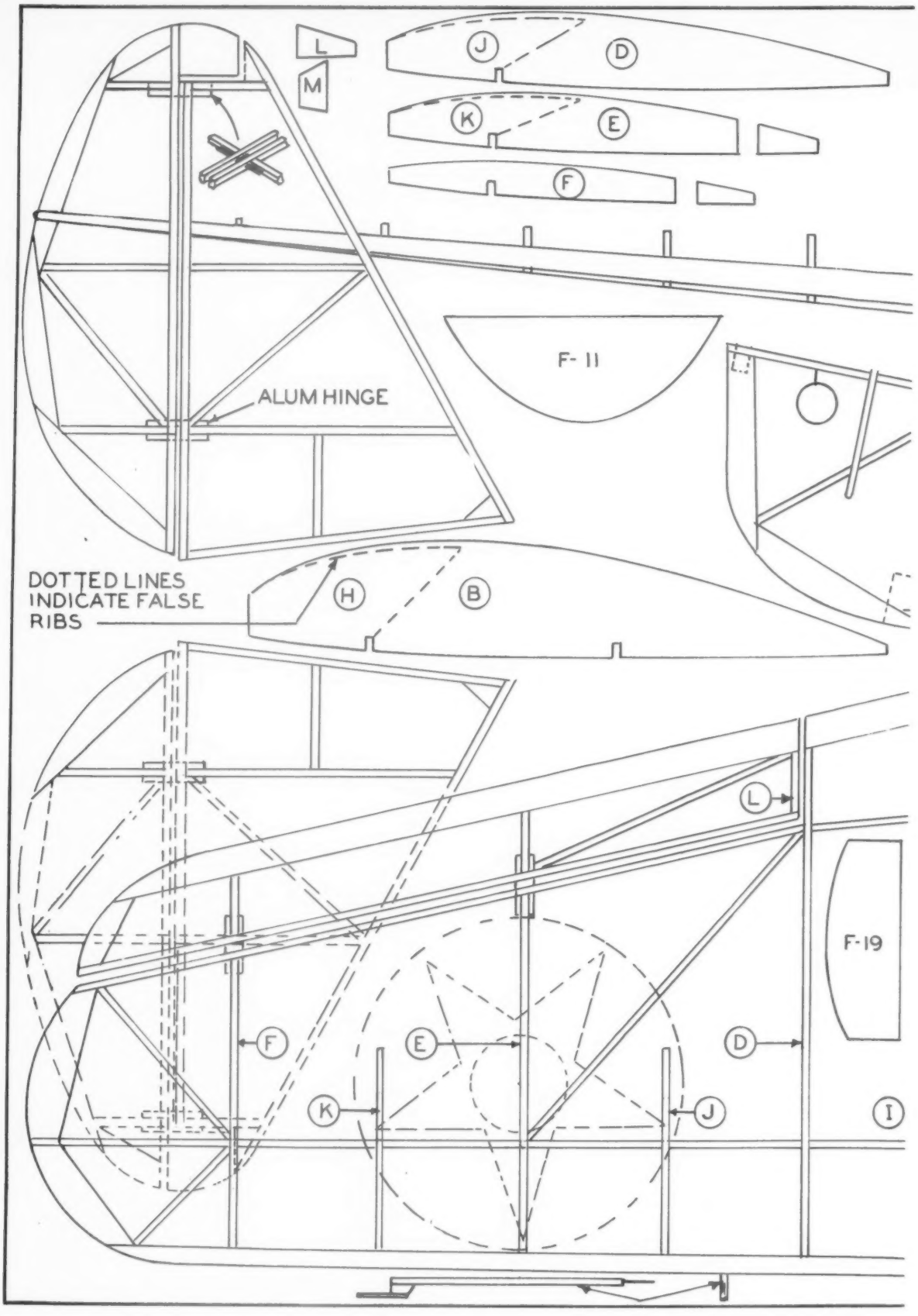
F-18

TOP VIEW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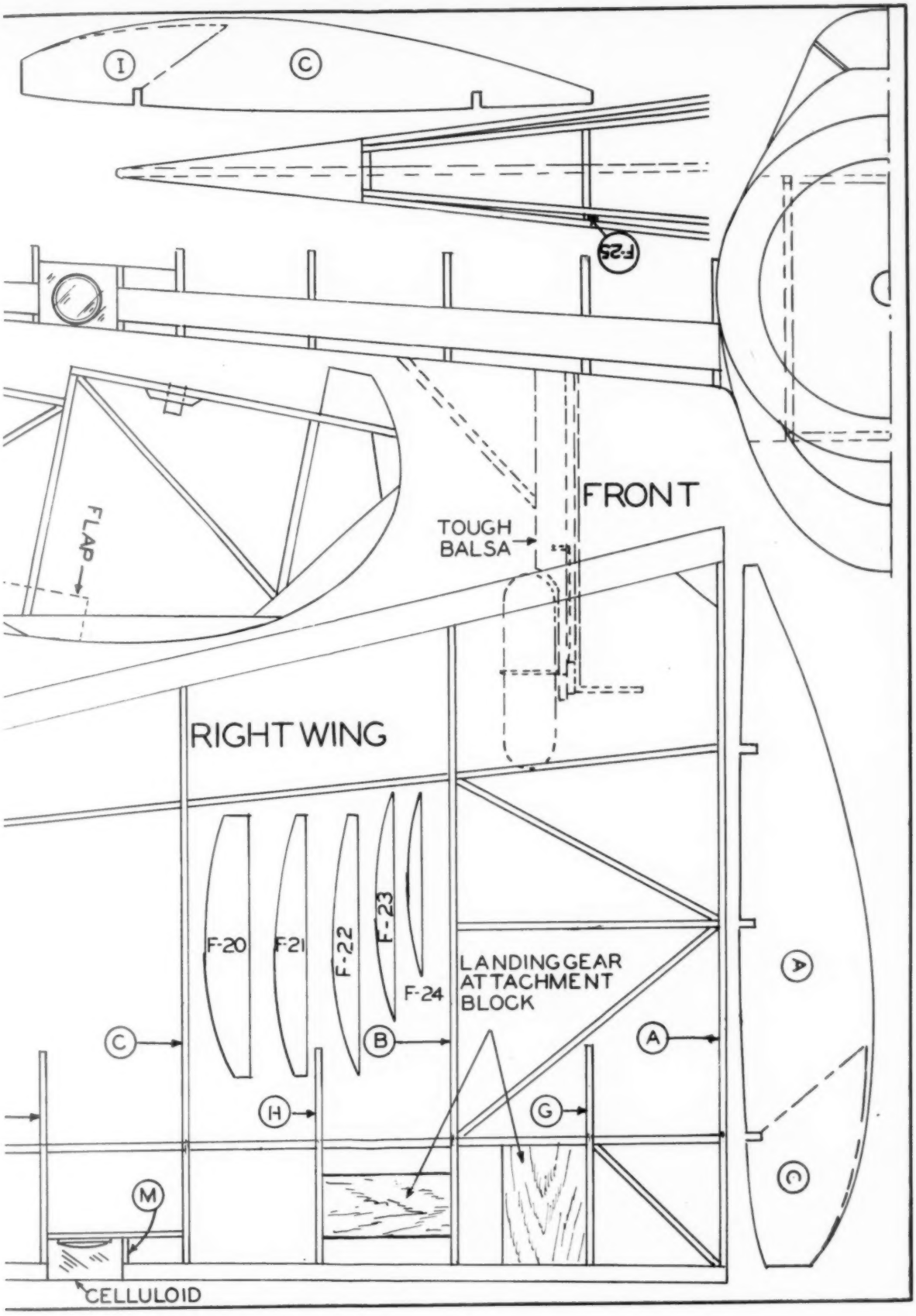
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LANDING GEAR
ATTACHMENT
BLOCK
C
B
A
H
G
M
CELLULOID

Wings

(*Continued from page 36*)

sion strut with single wire trussing is inferior to the N-strut with double-wire trussing, especially when used in thicker wings. The wire bracing should be of the non-slipping type (such as tie-rods).

The rigidity of the wing is improved by the covering which, after doping, adds from four lbs. per inch. This load has to be taken into consideration in dimensioning the leading and trailing edges and especially the end ribs. (Section 11.)

The tension of the doped covering makes it sag between ribs, which will lower the lifting efficiency of the wing. Section 12 shows methods of improving this condition by adding one or two short ribs (false ribs) between regular ribs, or covering the whole nose with plywood or sheet metal. This covering, securely fastened, adds extra strength to the wing.

The strength of the wing depends also on the travel of the center of pressure and the resulting twist may cause undue stress at high speeds by the sudden increase of incidence. Therefore the wing should be designed to withstand bending and torsional forces. Some of the designs combining the two beams are shown in Sections 13 and 14. One design is of interest where the whole front is made a unit; the difference is noted when compared with the conventional design shown in Section 15.

Originally, the successful airplanes were biplanes with two or three sets of braced struts, making it fairly rigid even when thin sections were used.

The fact that one pound of resistance is equal to from five to ten pounds of weight carried within the structure was an incentive to conceal non-lifting parts. The all-around efficiency was improved by the strut designs shown in Section 17. From the original strut with incidence wires to the I-strut was a short step; the leg of the I was placed at the load balance of the high and low angle of attack.

The multiplanes did not show any success but the biplanes with multibays did. The number of bays reduced as the wings became thicker and the lower wing became shorter. The result was the sesquiplane which again was followed by the braced monoplane and then by the cantilever monoplane.

The age-old fight for superiority between the monoplane and the biplane will keep on until monoplanes are built that have the same maneuverability of the biplanes. (Section 18.)

Another question in monoplane design is the location of the wing. Locating the wing for parasol-type or midwing type aircraft requires a full plan form. High wings should have cutouts and low wings should have fillets to be efficient. (Section 19.) This conception of the general layout will vary according to the airfoil section and fuselage design used.

Section 20 gives the approximate weight of the wing unit. Section 21 shows the weight ratio of wood ribs and the ratio of the maximum load to the weight of the rib for loading at a high angle of attack with its peak at one-fourth of the chord. For low angle of attack the weight ratio should be about 70 per cent of the one indicated on the chart.

There are 20,000 wing sections to select from for performance and strength calculation. A new airfoil and a new structural design must be substantiated by exhaustive laboratory tests, by a correct theory and by a simple stress estimation so that performances and strength can be closely predicted before that design can be generally accepted.

END

B. G. MICA AVIATION SPARK PLUGS
THE CHOICE OF THE AVIATION INDUSTRY
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THE B. G. CORPORATION
Contractors to the United States Army and Navy and Aircraft Engine Builders
136 W. 52nd STREET · NEW YORK, N. Y.

Glenn Martin

(*Continued from page 24*)

pull back on the stick enough to soar just over the fisherman's frightened heads. Once over them, he would splash down on the water again and head for another boat.

The youthful manufacturer left Los Angeles in 1916 and moved to New York, merging his interests with the Wrights to form the Wright-Martin Aircraft Corp.

This partnership was dissolved in 1917 and he moved to Cleveland. Here he built the first Martin bomber, a huge bi-motored ship that carried 2,200 lbs. in bombs.

At the instance of Navy officials, he finally moved to Baltimore, Maryland, and built a $2,500,000 aircraft plant capable of turning out a giant plane every seven and a half hours. Since he has been in Baltimore his contracts have been chiefly for the government, consisting mainly of bombers and patrol boats.

On March 21, 1930, a Martin ship became the first heavy bomber to loop the loop with a bomb load of a thousand pounds and 420 gallons of gasoline. William H. McEvoy, chief test pilot for the National Advisory Committee for Aeronautics was at the controls.

In 1933 Martin's high speed bomber won him the coveted Collier trophy for the outstanding aeronautical achievement of the year.

So fast was this bomber that it outflew the pursuit ships which were supposed to protect it. Naturally, they caused a sensation. Martin journeyed to the White House and received his deserved trophy at the hands of President Roosevelt.

Next came Pan American Airways with its order for trans-Pacific clipper ships. From out of the Martin factory in 1935 and '36 came the famous *Hawaii, Philippine* and *China Clippers* which blazed new epoch-making trails to the Orient.

In January 1937, Gardner W. Carr of Seattle, recently vice-president of the Boeing Aircraft Company, was named vice-president of the Glenn L. Martin Company and will put into operation a two million dollar expansion program which will double the plant's capacity. An assembly hall 300 feet wide by 500 feet long with a net head room clearance of 40 feet will be constructed. It will constitute the largest unobstructed airplane factory space in the world, having the greatest unobstructed span of girders of any aircraft factory.

Already, Glenn L. Martin has drawn specifications for ships doubling the size of the China Clipper and is ready to arrange production if there is a demand. Unfilled orders at the end of 1936 totalled $9,603,327—not bad for a boy who started out with nothing but a pencil, paper, and an idea.

END

Courtesy of POPULAR AVIATION

The World's Lowest Priced Seaplane

Cub has done it again! Now, for the first time in aviation history, you can have a splendidly performing, two-passenger seaplane for only $1895—hundreds of dollars lower than a seaplane was ever priced before!

The New Silver Cub Seaplane at $1895 gives you double value—for this sensationally low price includes not only the genuine Edo Floats specially designed for it but also the regular wheel landing gear. And each is easily and quickly interchangeable with the other!

Its dependable, 4-cylinder, motor is an important reason for the New Silver Cub's remarkable performance, inherent safety and amazing economy. In fact, all over the country owners report gas consumption of less than 3 gallons of gas per hour and almost no oil! It lands on river, lake or ocean for *it is completely metallized to protect fuselage and parts from salt water.* Sales reveal a truly phenomenal demand for this combination land- and seaplane that's low in price and economical to operate!

If you prefer the New Silver Cub without floats, you can still purchase it at its extremely low price of $1270 F.A.F. Bradford, Pa. But with floats or without—the New Silver Cub is aviation's biggest value! Order now while you are assured of immediate delivery.

New Silver CUB Landplane
Now Only **$1270** *F. A. F. Bradford*
Down Payment $425, Balance Monthly

TAYLOR AIRCRAFT COMPANY
77 Aviation Street, Bradford, Pa., U. S. A.
Cable Address: CUB

FREE! Send today for our new, colorfully illustrated folder and name of your nearest Cub dealer. Paste coupon below on penny post card, if you wish.

TAYLOR AIRCRAFT COMPANY
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Please send me your new, illustrated, free folder and name of my nearest Cub dealer. No obligation.

NAME _____
ADDRESS _____
CITY _____

The New Silver CUB
THE WORLD'S FASTEST SELLING AIRPLANE

Airy Chat

(*Continued from page 12*)

are either converted motorcycle or automobile engines, or else second-hand lightplane engines of nearly a generation ago. Heaven knows that there are enough patterns, tools and jigs to fill the country full of engines, but the lack of proper financing and similar difficulties prevent them from becoming commercial realities.

* * *

AMATEUR activities make the industrialists peevish and, as a result, it is not long before the amateur is facing a lot of prohibitive legislation. For example, if an amateur aircraft builder succeeds in building a kitchen-sink ship with real performance, then he has the engineering and manufacturing interests to combat—promptly.

The same thing happened with the radio amateurs back in '22 and '25 who were making tremendous progress in the development of radio receiving sets and transmitters, much to the dismay of the large manufacturers. They paid the penalty of their enterprise by being shoved way down in the short-wave band in order to clear the way for the big-shots, but they soon turned tables on their foes by developments in short-wave apparatus that were promptly grabbed by the big radio concerns.

Going back still further, to the balmy days of the gay nineties and the early nineteens, we find other amateurs building automobiles in their basements and wood-sheds, using kit-sets in some cases and alley refuse in others.

And, among them was Henry Ford working away in his small shop. But, it wasn't very long until the poor amateurs were hung by the A. L. A. M. and forced to discontinue by virtue of certain documents held by the Association of Licensed Automobile Manufacturers, owners of the notorious Selden patent. That is, they stopped them all except that most eminent amateur—Henry Ford who fought a noble fight to make automobile building safe for democracy.

Amateur activities speak for progress in every line. When the interest of the amateur ceases, then progress in that line also ceases. And, the consistent pressure brought to bear upon the amateur airplane experimenter is one reason why aviation has developed so slowly.

The big basic inventions do not originate in the laboratories of the big manufacturer with salaried workers. They originate in the homes, small shops and factories under the direct guidance of the inventor who, in most cases, later pays the penalty for his ingenuity.

* * *

WELL, they can't say we're not trying our best for the amateur. We have seen so much injustice done to this branch of aviation we are determined to get some sort of "new deal" for aviation's "forgotten horde". We have many cases on file here of foolish law enforcement against air-minded young men.

Barkley-Grow

(*Continued from page 31*)

is 213 m.p.h., while top speed at 5,000 ft. is 225 m.p.h. Using 75 per cent power, the ship has a rated cruising speed at 9,600 ft. of 204 m.p.h. while the ship's cruising speed to attain the maximum range (730 miles) is 190 m.p.h. at 65 per cent throttle.

The Barkley-Grow transport is strikingly similar to the current Lockheed transports in appearance with the exception of the landing gear which, on the T8P-1, is non-retractable.

The new ship's cabin has been especially designed and executed for quiet and comfort for passengers. Sound decibel readings are said to be in the low seventies.

Cabin windows are Plexiglas, a synthetic organic plastic, which replaces glass windows. Plexiglas, besides being highly flexible, is half as light as glass and transmits less sound but more light than glass.

The pilot's cockpit, however, is fitted with shatterproof glass as well as a full complement of blind flying instruments.

One test Barkley-Grow engineers recently put the new wing to showed possibilities of the Barkley invention proving valuable in time of war. A wing panel recently was riddled by sub-machine gun fire yet, after the blasting volley, the wing still was in flying condition.

Operator	Western Electric
American Airlines	✓
Atlantic & Gulf Coast Airways	✓
Braniff Airways	✓
Chicago & Southern Air Lines	✓
Delta Air Lines	✓
Eastern Air Lines	✓
Grand Canyon Airlines	✓
Hanford Airlines	✓
National Airlines System	✓
National Parks Airways	✓
Northwest Airlines	✓
Pennsylvania-Central Airlines	✓
T. W. A.	✓
United Air Lines	✓
Varney Air Transport	✓
Western Air Express	✓

Do you know what RADIO equipment the air lines use?

All the major U. S. air lines use the standard make of radio telephone equipment: Western Electric. More and more of the country's leading private flyers are installing Western Electric, too.

Whether you operate a fleet of transports—an airport—or a single plane, there's tried and true Western Electric equipment designed for you. Write for booklets to Western Electric, Dept. 310 PA, 195 Broadway, New York.

Transmitter for private planes.

Receiver for private planes.

Western Electric

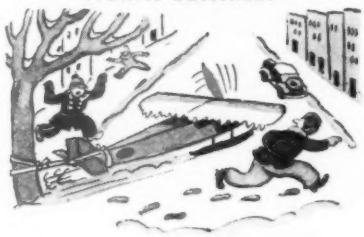
Northern Electric in Canada

AVIATION RADIO TELEPHONE

I've been asked for specifications on yarns for the Perch. Here they are: (1). If home-made—no limits to landing speeds.(2). Stock models—all landings with wheels "up." (3). Motors—Real and Imaginary Aircraft Engine Company—(any power). (4). Any fuel below 40 octane—so that we can listen to a "knock" once-in-a-while. (Get me?) (5). If you have ever seen a motor of a plane or anything else you did not want to change, do not fill in entry blank. (Got me?) (6). We have tightened our helmets and goggles and removed windshields—*CONTACT!*

MAJOR AL WILLIAMS, alias "Tattered Wing-Tips," *Mgr., Aviation Dept.*, Gulf Aviation Products, Gulf Building, Pittsburgh, Pa.

CRAZY GUY FROM THE NORTH CONTREE!



A few months ago a well-known Saskatchewan airman was hauled up in court.

The judge handed him out a fine for obstructing *pedestrian* traffic on one of the principal streets of Regina. The birdman, you see, had landed at the airport and, feeling lazy, just taxied on skiis down the snow-covered streets of Regina.

Since Regina is no one-horse town but a city of 50,000, you can see that the lad had his nerve to use the streets for an airplane boulevard.

The officer who arrested him said that the motor was running *and the plane was tied to a tree*. Since he had to tie the crate up, I figured he must have been using Gulf Aviation Gas—and that you would like to hear about the story.

—Jim Miller, Bladworth, Sask., Canada

STRANGE HOBBY DEPARTMENT

(Excerpt from the July Perch)

"A pilot I nominate for immortalization is 'Spike' Callahan. 'Spike' washes dishes for a living and, in his spare time, flies.

"*Is it hard to get their ears clean, 'Spike'?*"

—H. L. L.

IS S. M. PULLING OUR LEG?

This pilot (whose name I'd like to know) was cruising over a small town when his engine caught fire.

Having no fire extinguisher, he bailed out. When he reached the ground, he found to his surprise that the fire had gone out and that the ship was flying in circles.

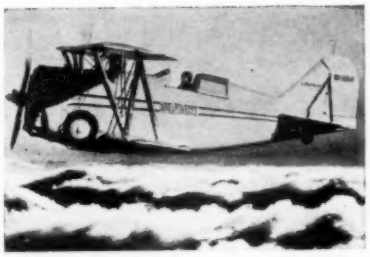
A warning was broadcast and the whole town stood amazed with eyes on the sky. Even factories shut down for fear the ship might crash through the roof.

For four hours that ship flew in endless circles. At last, with the gas supply exhausted the ship started on a downward course. And, believe it or not, that plane landed "dead stick" in an open field. It had a washed out landing gear and a smashed prop.

This incident, I believe, took place somewhere in California. Can some one verify it for me?

—S. M., Shillington, Pa.

THE EDITOR'S NEW BABY



Here's Al Williams' new Grumman G-22, powered with a 1000 h.p. Wright Cyclone engine. Besides plain and fancy flying, Al will use this ship to test Gulf's new *Airline Oil*.

Already, tests show that this 100% Pure Pennsylvania Oil is the best ever developed for airplane use, but we want to make it still better. *Gulf Airline Oil* is refined by the exclusive Alchlor process. Other leading oils, when re-refined by this process, give off as much as 20% black, sticky waste.

THIS MONTH'S WHOPPER

Out in Joliet, the humble-bees are made of lead. I know, because I caught one in my hand. It was like this.

One day I was up in my plane, just horsing around, when I happened to pass over a chicken farm. Now, I love chickens.

I think they're man's best friend, especially with gravy. So I swooped down low just to say hello to the biddies.

Trouble was, I got too low. So low that the fowl belles got scared and set up a terrible cluck-cluck-cadockit.

The farmer ran out with a shot gun, and I vamoosed.

Then, something funny happened. I looked out the side of the cockpit and saw a swarm of bees. They were going along at the same rate of speed that I was traveling.

Being curious, I put on a glove, reached out and grabbed a handful. Was I surprised to find that I had a handful of buckshot.

With that Gulf Aviation Gas I was using, the speed of my old Jenny was exactly the speed of the buckshot.

—"Chuck" Winston, Joliet, Illinois

Gulf Oil Corporation and Gulf Refining Company . . . makers of

GULF **GULF AVIATION PRODUCTS**

Tokio-Paris

(*Continued from page 40*)

Vien-Tiang. Arrived 10 hr. 50 mins.
Rested 12 hrs. 36 mins.
Second Day—April 6-7th
Vien-Tiang. Took off 23 hr. 26 mins.
750 miles (1,200 kms.) in 5 hrs. 10 mins.
Calcutta. Arrived 4 hr. 36 mins. Left 5 hr. 30 mins.
1,375 miles (2,200 kms.) in 8 hrs. 20 mins.
Karachi. Arrived 13 hr. 50 mins.
Rested 10 hrs. 25 mins.
Third Day—April 8th
Karachi. Took off 0 hr. 15 mins.
1,250 miles (2,000 kms.) in 6 hrs. 30 mins.
Bassorah. Arrived 6 hr. 45 mins. Left 7 hr. 35 mins.
281 miles (450 kms.) in 1 hr. 40 mins.
Baydad. Arrived 9 hr. 15 mins. Left 10 hr. 3 mins.
1,220 miles (1,950 kms.) in 6 hrs. 12 mins.
Athens. Arrived 16 hr. 15 mins.
Rested 13 hrs. 25 mins.
Fourth Day—April 9th
Athens. Took off 5 hr. 40 mins.
687 miles (1,100 kms.) in 3 hrs. 5 mins.
Rome. Arrived 8 hr. 45 mins. Left 9 hr. 36 mins.
750 miles (1,200 kms.) in 3 hrs. 56 mins.
Paris. Arrived 13 hr. 32 mins. (GMT) Left 14 hr. 16 mins.
230 miles (375 kms.) in 1 hr. 9 mins.
London. Arrived 3 hr. 25 mins. (GMT)

The plane flown by the Japanese airmen on this long distance flight was constructed in the shops of the Mitsubishi Co. at Nogaya, Japan. It was a low cantilever wing two-seater single engine monoplane of metallic construction throughout, with the exception of the empennage and the ailerons which are covered with fabric.

The fuselage has a circular monocoque form with the engine mounted in its nose and the NACA cowling well streamlined into the general contour of the plane. The pilots' and observers' seats are installed in tandem, about 4 feet apart, in the center of the fuselage and equipped with windshield hoods of transparent celluloid material which folds back on hinges to the right-hand side.

Two small window slits are installed one above the other in the middle of each side of the fuselage in a line with the observers' seat.

A large vertical fin of trapezoidal shape, well streamlined into the general lines of the plane constitutes the rear portion of the fuselage. The horizontal control surfaces (elevators) are likewise of trapezoidal form. The directional rudder and elevators are equipped with compensating tabs.

The wings are constructed in three sections.

The center section, of rectangular form, is built into the lower part of the fuselage, with large Karman wing fillets used at the intersections. The two outer wing panels have a trapezoidal shape and taper in chord and thickness. They are joined to the central section at a pronounced dihedral angle.

The ailerons extend from the wing tips along the trailing edge for about one-half the span of the outer panels. Short, deep chord, split flaps are then mounted a portion of the distance between the ailerons and the center section of the wings.

The landing gear is of the fixed type with the wheels covered with large fairings and mounted on vertical cantilever struts, well streamlined and fitted with oleo-pneumatic shock absorbers.

The power plant is composed of a 9 cylinder radial, air cooled, engine, "Makasima" type, which gives a maximum of 580 hp. at 2,500 r.p.m. It has a cylinder displacement of 32 (1,955 cu. ins.) liters, and a fuel consumption of 230 grammes (approx. 8 ounces) per hp. hour. The volumetric compression ratio is 5, 5:1. The engine is fitted with a fixed pitch propeller.

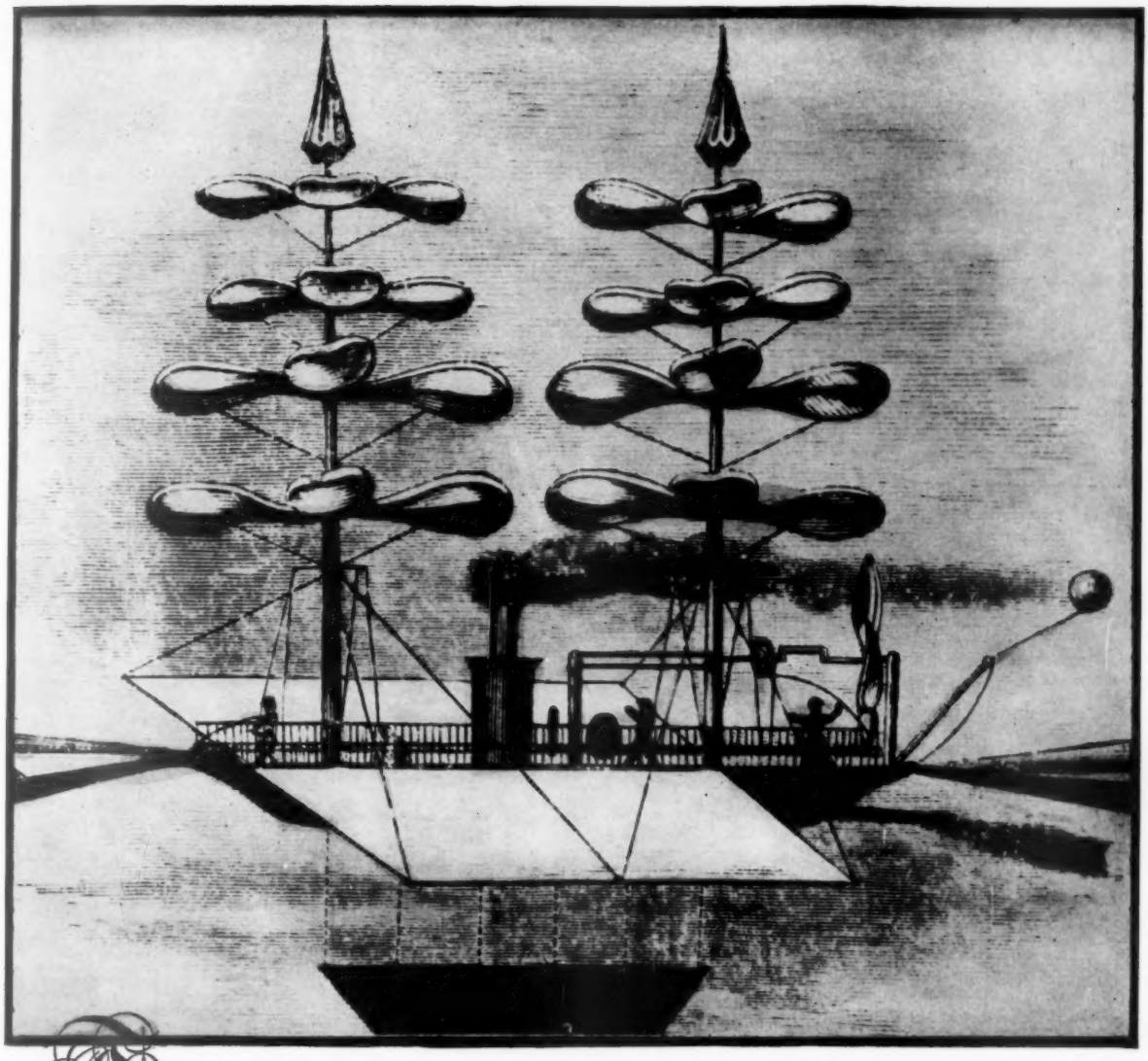
The flight radius is 2,400 kms. (1,500 miles) at 320 k.p.h. (200 m.p.h.).

GENERAL CHARACTERISTICS

Wing span	...39 ft. 5 ins.	(12 meters)
Length	.....25 ft.	(8.28 meters)
Height	..... 6 ft. 10 ins.	(2.80 meters)
Wing surface	.20 sq. meters	(215 sq. ft.

END

BRANIFF AIRWAYS USE GENERAL TIRES
General twin-ten tires are exclusive equipment on the new fleet of big Douglas Transports that Braniff operates. Braniff Airways know the important place that Generals occupy in maintaining schedules and safeguarding passengers.
General's experience in developing tires for the army, navy, prominent airlines and plane manufacturers will be helpful in successfully solving your tire problems. An opportunity to discuss your particular needs will be appreciated.
GENERAL TIRE & RUBBER CO.
AKRON, OHIO, U. S. A.
GENERAL Airplane TIRES



The father of "Aviation" had to design for steam

GABRIELLE DE LA LANDELLE frowned. Flying should be on a scientific basis. The Vicomte de Ponton d'Amecourt and Felix Tournachon agreed. Had he not designed the "Steam Air Liner" the year before? Now, in 1864, the three had formed a society for further study. What should it be named? Slowly his pen traced "Societe de—AVIATION." The infant science was christened for all time.

His "Steam Air Liner," pictured above, startled the world. Octuple air screws provided lifting power. Large planes on either side were to maintain equilibrium. Parachutes atop each mast were to open when needed. Everything had been remembered. Everything but one. That had not yet been discovered—GASOLINE!

A practical power-weight ratio could not be established with a steam engine. So Landelle's design became another quaint picture in aviation's history.

Today, progress in aviation still depends on the inseparably linked fuel and engine. Constantly better gasolines open the way to better design. Even while Ethyl in aviation gasolines keeps pace and faith with present engines, Ethyl engineers are cooperating in research to bring the planes of tomorrow nearer. Ethyl Gasoline Corporation, Chrysler Building, New York, N. Y.

Do You Know...

. . THAT Wright Cyclone and Whirlwind engines power the majority of the leading airlines of the United States—and many other important airlines throughout the world.

. . THAT American Airlines, Eastern Air Lines, Pan American Airways System, and Transcontinental & Western Air operate great fleets of luxurious 14 to 25 passenger Douglas Day Planes, Club Planes, and giant Sleeper Planes powered exclusively by Wright Cyclones.

. . THAT you can fly from Chicago to New York in Cyclone-powered Douglas airliners in 3 hours, 55 minutes . . . from New York to Miami in 7 hours, 45 minutes and from Los Angeles to New York overnight in 14¾ hours, in a luxuriously appointed Douglas Sleeper Plane—astounding examples of the progress of aviation!

. . THAT Wright Whirlwind engines, developed from the type that powered Colonel Charles A. Lindbergh's famous non-stop, solo flight from New York to Paris, power swift Lockheed Electra Transports now in service on Chicago & Southern Air Lines, Delta Air Lines and Eastern Air Lines.

. . THAT during the past 10 years air transportation throughout the world has experienced a phenomenal growth. Passenger traffic in the United States alone has increased from a few thousand airline passengers in 1927 to over a million in 1936. Plane miles flown over America's leading air routes have increased from a few hundred thousand miles in 1927 to over 64,000,000 miles in 1936—43½% of the world's total commercial transport flying.

. . THAT wherever you travel—in the United States, Canada, Central America, South America, Europe, Africa, Asia, Australia—you can fly in swift, modern transports powered by Wright aircraft engines.

"Fly with Wright the World Over"

WRIGHT
AERONAUTICAL CORPORATION
PATERSON NEW JERSEY

A DIVISION OF CURTISS-WRIGHT CORPORATION

T-2003

(*Continued from page 43*)

Back to the old them-was-the-happy-days discourse, I resumed, ". . . and these picnic clubs, they're also an offshoot of the old aero clubs of 1933 in the days when not every youngster could afford his own crate, and instruction was so lengthy and costly that expenses were cut by pooling resources."

"I remember when safety nets around roof-landing areas were a private proposition. The building owners were required to have only a 10-foot width of steel net around the building and some skimped even on that. Then one day when the mayor was driving down this very street below, one dumb egg landed on that roof opposite, slid over the cornice and tumbled over into the street. Twelve killed, and it nearly got His Honor.

"Pedestrians had an awful time of it in those days of '42. Now you notice the municipal nets from building to building over the entire street width. They say His Honor cleaned up in the steel market on that, because Chicago and other large cities followed suit on municipal nets."

"But I can't blame anyone. When the Department made my automatic brake optional equipment for two years I also cleaned up. That was in the same year. It was a good idea while it lasted. Wheel brakes tied in with a tail wheel. When the latter had pressure the brakes were on, but when the tail lifted a bit the pressure came off the tail wheel and the landing wheel brakes were released. I had doped that out away back in 1924 when airplane brakes were quite new. Funny, though, how the universal adoption of the forward single-wheel nullified my good idea.

"But who could have foreseen how the auto manufacturers merged with the airplane people when the auto market became saturated. In 1937 I owned an air-conditioned auto; but it took six years longer to find the first really air-conditioned airplane; I mean *complete* air-conditioning with cabin oxygen and postive temperature and humidity control in production model airplanes.

"Look how the auto trailer market got saturated by '41. But what grew out of it? The articulated airplane, like they're experimenting with out on the West Coast. That, too, was a combination idea; of auto trailers, towed aerial gliders and the articulated high-speed railroad trains. Seems like a swell idea, but no one knows how it will pan out, or how large these articulated combinations will grow.

"In 1930, most everyone was convinced that the superplane was a financial fizzle. The German D-O-X boat, and even the Fokker F-32 with its two pairs of tandem engines were pointed out as horrible examples. But seven years later came the Sikorsky 40-ton boats for the trans-oceanic trade; then the 65-tonners, and now see what they have for the trans-Atlantic trade. Just about killing the so-called luxury liner steamships; but a sea-faring man back in '35-'36 said that it would, because as he then reasoned, who would care to spend 5 or 6 days aboard ship at a high passage fare when for less money one could fly from New York to London in about 20 hours."

The silent teletype instrument in the office gave three rings to announce an item of aeronautical news. Another one of those asleep-at-the-stick accidents. Seems like they should equip these automatic pilots with some warning device to wake up sleepy pilots when necessary.

END

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(*Continued from page 38*)

$$V\,L\left(\frac{\rho_1}{\mu}\right) = V_0\,L_0\left(\frac{\rho_0}{\mu}\right)$$

where:

L = Chord of model in feet.
V = Velocity at which test is run in feet per second.
ρ_1 = Density of compressed air in slugs per cu. ft.
L_0 = Chord of full-size wing in feet.
V_0 = Speed of airplane in feet per second.
ρ_0 = Density of standard air.
μ = Coefficient of viscosity of air.
$\frac{\rho}{\mu} = \frac{1}{\nu}$ = Reciprocal of the kinematic viscosity of air.

The kinematic viscosity of air, (ν), for standard sea-level conditions is 0.000159 sq. ft. per sec. Obviously, the R.N. is 6,290 (V in ft./sec. × L in ft.). When V is in m.p.h. the R.N. = 44/30 × 6,290 × (VL).

The variable-density wind tunnel used by the N.A.C.A. was designed to meet the conditions explained above.

In the simplified forms for lift and drag, $L = K_y AV^2$ and $D = K_x AV^2$, the coefficients K_y and K_x must include the effects of all the qualities in the complete formula except the area, A, and V^2. In the absolute simplified forms for C_L and C_D, $L = C_L \times \frac{1}{2} SV^2$ and $D = C_D \times \frac{1}{2} SV^2$, the mass density of the air is used making the coefficients nondimensional.

In the complete formula, however, the drag of any solid or air foil may be computed in any fluid and any density. In the case of pure streamline bodies the effect of each value of fineness ratio may be noted.

With such bodies the simplified formulas prove accurate enough while with the complete formula a fair degree of accuracy can be had concerning any ordinary shape or tested airfoil.

This is especially true of airfoils since the R.N. has been accurately determined from flight tests and otherwise, the R.N. for the Clark "Y" being 3,250,000 and for the M-6 the R.N. is 3,030,000.

The airfoils were tested in the variable-density wind tunnel.

END

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Foreign Planes

(*Continued from page 16*)

SAVOIA-MARCHETTI S-72

The Italian bomber probably most-used and most-seen in newsreels and printed publications during the recent Ethiopian campaign was the Savoia-Marchetti S-72 tri-motored high wing monoplane. Closely resembling the old American Fokker F-10A tri-motored transport, the S-72 has a remarkable capacity for weight-lifting.

Powered with three 550 h.p. Bristol "Pegasus" engines, the S-72 can carry its fully loaded weight of 28,160 lbs. at a top speed of 183 m.p.h. at 13,120 feet. Cruising speed at the same altitude is 152 m.p.h. Landing speed, with flaps, is 58.9 m.p.h.

As a bomber, the S-72 carries its bombs in an enclosed bomb pit on the underside of the fuselage, has machine guns on each side of the fuselage and there are retractable machine gun turrets both in the roof and floor of the fuselage.

FOCKE-WULF FW-44

This trim, rugged trainer is rapidly becoming one of Europe's most popular types as it is admirably suited for everything from primary training to advanced aerobatics. Constructed largely of steel tubing, fabric covered, the FW-44 is powered with a 150 h.p. Siemens engine, has a top speed of 114 m.p.h. and a landing speed of 45 m.p.h.

FOCKE-WULF FW-56

Known also as the "Stosser", the FW-56 is an advanced training monoplane powered with a 240 h.p. Argus engine and is used largely to give pursuit h.p. Argus engine. Maximum speed is 166 m.p.h. and it lands at 55 m.p.h.

FOCKE-WULF FW-58

Constructed primarily for training pilots on twin-engined military craft as well as serving as a general-purpose ship, the FW-58 is also known as the "Weihe" and is powered with two 240 h.p. Argus engines. Maximum speed is 158 m.p.h., cruising speed 146 m.p.h., and landing speed 50 m.p.h. The ship is quickly convertible to either a fighter-bomber or to an elaborate trainer.

END

Seversky

(*Continued from page 28*)

basically the same this problem resolved itself merely to one of procurement. It is a Seversky "ism" that the faster you want to be in production with a new type the longer it takes to build the first airplane.

This, because each new departure calls for a complete new tooling, with its attendant delays. Hence, Major Seversky reasons, from a national safety viewpoint, it is better for his company to adhere to the basic type theory.

END

Swanee Taylor

(*Continued from page 42*)

sonal Glenn Curtiss scrap-book. (Trust pilot Bill Stackpole to come up with another good one) . . . Note to the Industry: You insult the intelligence of the Army and Navy procurement boards when you persist in believing that the editor of that little jingo journal can influence the sale of a bucket of propwash. (Who doesn't know a congressman or two) . . . Silliest bid for newspaper space on record is that letter from the Air Races press agent who wrote: "We will have two passes available for your paper . . . the only prerequisite is that you mail us copies of your paper containing our stories". (Thereby earning himself a job at the great Cleveland chisel) . . . And a loud cheer for the best magazine article on Airline crashes done by Dave Behncke in May 15 issue of *Liberty*. It was a clear exposition of the pilot problems, hence the most interesting of the lot and likely to do the most good. I plan to read it frequently.

END

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Hillcrest Station, Box 8—San Diego, Calif.

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All you have to do is find the greatest number of words in the letters IMPERIAL MODEL

Number the words from 1 up. Put each on a separate line. Do not use names or proper nouns.
Send in your entry with an order for $1 or more, not later than July 31, 1937. The decision of the judges will be final. In case of tie, duplicate prizes will be awarded.
The winner receives $10 cash and $10 worth of any kits or supplies in the Imperial line, or, if desired, a BROWN JR. GAS MOTOR.
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3/32x3/32 30, 5c
1/8x1/8 30 for 5c
1/8x3/16 12 for 5c
1/8x1/4 10 for 5c
3/16x3/16 8, 5c
1/4x1/4 6 for 5c
1/4x1/2 3 for 5c
1/2x1/2 2 for 5c
1/64x2 6 for 10c
1/32x2 8 for 10c
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double above prices

18" PLANKS
1x1 5c; 1/2x2 6c
1x1 1/2 8c; 1x2 10c
1x3 15c; 2x2 18c
2x3 23c; 2x6 39c
3x3 40c; 3x6 75c

TISSUE, AA
All col., doz. 19c
Silver ....ea. 5c
Superfine, wh. 5c

WHEELS per pr.
Birch Bliss Celu
1/2 .01 .03
3/4 .02 .04 .05
1 .03 .05 .07
1 3/4 .04 .08 .10
1 7/8 .07 .10 .16
3 .15 .30

PINE WHLS., pr.
Both sides alike
3/4" 4c; 1" 6c
1 3/8" 8c; 2" 12c

NOSE BLOCKS
1x2x1 .....1c
2x2x1 .....2c
2x2 1/2x1 .....3c
3x3x1 .....5c
3x3x2 .....8c
3x3x3 .....10c

INSIGNIA
24 and stripes 5c

WASHERS
1 doz. 1/8 or 1/4 1c

THRUST BEARINGS
Small ...doz. 10c
Large ...doz. 15c

RUBBER
.045 ....25 ft. 5c
1/16 sq., 20 ft. 5c
1/8 flat ..15 ft. 5c
3/16 flat 12 ft. 5c
Skein 50c

RUBBER LUBRICANT
Large bottle 10c

PROPELLER BLOCKS
1/2x 2 1/2 x 3 8—5c
1/2x 3/4 x 6 6—5c
5/8x1 x 7 4—5c
5/8x1 x 8 3—5c
2 1/4x1 1/4x10 2—5c
2 1/4x1 1/4x12 3c ea.
1 x1 1/2x12 4c ea.
1 x1 1/2x15 6c ea.

SHEET ALUM.
.0003x3 1/2 ..ft. 1c
.005 in. 6x6 5c
.010 in. 6x6 6c

CLEAR DOPE
5c per oz.; Large bottle, 8c; 1/2 pt. 30c; 1 pt. 45c

THINNER
Same as clear dope

COLORED DOPE
6c per oz.; large bottle 10c; 1/2 pt. 35c; pt. 60c

CLEARCEMENT
5c per oz.; large bottle, 8c; 1/2 pt. 35c; 1 pt. 55c

MACHINE-CUT BALSA PROPS
5" 4c; 6" 5c;
7" 6c; 8" 7c;
10" 8c; 12" 10c;
13" .15c

CAMEL'S HAIR BRUSHES
Small 3c; Lge. 5c
Extra large... 8c

NOSE PLUGS
1/8" ... 12 for 8c

DUMMY RAD. ENGINE (Celu.)
1 1/2" d. 15c; 2" d. 20c; 3" d. 25c.

ENGINE AND COWL (Celu.)
1 1/2" dia. ...15c
2" dia. 20c
3" dia. 25c

CELLULOID PANTS, per pair
1/2" to 1" ...18c
1 1/8" to 1 7/8" .33c

METAL PROPELLERS
2 blades 3 blades
1 1/2" .5c .... .08
2 1/2" .10c .... .10
3 1/2" .15c .... .20
4 1/2" .20c .... .25

ALUM. TUBING
1/16,3/32, 1/8 ft. 7c
3/16 or 1/4 ft. 10c

ALUM. COWLINGS
1 1/2" 15c 2" 18c
3" 25c
Specify whether anti-drag or closed

BOMBS
3/4" ..4c 1 1/4" ..7c
2" ..12c

GUNS WITH RING MOUNT
1 1/4" 10c 1 3/4" 15c

PURSUIT MACH. GUNS
3/4", 1 1/4" or 1 3/4" each 5c

BUSHINGS
1/16 ....4 for 1c

WOND. WATER SPRAYER 15c

MODEL PINS
1/2" or 1" pkg. 5c

SANDPAPER
Doz. sheets....5c

PROP. SHAFTS, REAR HOOKS
doz. 8c

MODEL STANDS
Sm. 15c; lg. 25c

BAMBOO
1/16 sq. x12, 3c, 5c
1/16x1/4x15, dz. 10c

DOWELS
1/16x6 ...doz. 5c
3/8x18 ...2 for 3c
3/16x1/4 ..2 for 5c

WIRE
6-8-10-12-14
..2 ft. 1c

WOOD VENEER PAPER
20x30 ..1 for 10c

BAMBOO PAPER
2 for 15c

CELLULOID
6x8 .....3c
12 1/2x16 ..18c

WING AND TAIL LIGHTS
12" 10c; 15" 15c; 24" 20c.

REED
1/32-1/16 2 for 1c
3/32-1/8 ..1 ft. 1c

20 IN. FLYING PLANS 10c—3 for 25c
Sparrow Hawk, Boeing Trans. 247, Spad Chass., Vought Corsair, Curtiss Swift L. W., Waco Cabin Biplane, Douglas Dolphin, Boeing P12F, Fokker D-VII, S.E.5, Goshawk, Gee Bee, Boeing P26A, Monocoupe, Northrop Gamma, Fairchild 24 Cabin, Corben Super-Ace.

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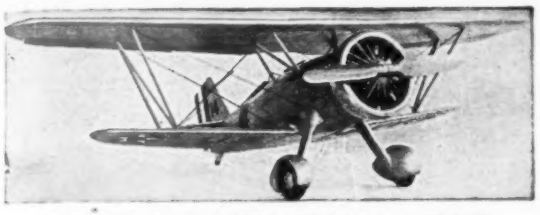
NEW CURTISS F11C4 NAVY PURSUIT



28" Span. Length 20½". Weight 4 oz. 1" Scale

THE MOST EXCLUSIVE AND FINEST EQUIPPED MODEL IN THE WORLD
A special De Luxe model, one of the most beautiful and finely detailed ever made, with its special exact scale 3¾" celluloid. 1000 H.P. type, Wright Cyclone motor, having aluminum push rods, cylinder fins, etc., like real motor. Also in set are 4" aluminum cowl ring, 9" carved spruce semi-scale flying propeller, colored star and rudder insignia, 2" celluloid balloon wheels, silver dope, paint, black, red stripings, Navy lettering, wire parts formed, axles, rubber motor, windshield, instrument board, flying wires, 4 aluminum step plates, aluminum wing walks, ready cut wheel pants, etc. All other parts printed on balsa. Detail scale drawing.
Construction Set complete, postpaid..... $4.50

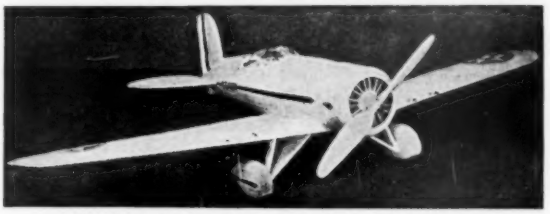
41" LOCKHEED ARMY SPEED VEGA

41" Span. Length 28". Weight 8 oz. 1" Scale

This new model, built very strong yet light in weight, is practically crashproof and will out-perform any large scale model built. Rises from ground in 10 feet and flies over 650 feet. Set contains all parts printed on balsa, ready cut pant cores, 4¼" turned motor front, 11" steel type carved paulownia wood propeller, 2½" balsa wheels, tail wheel, formed wire parts, 26' rubber, 3 oz. yellow dope, 2 oz. blue, ½ oz. black, 2 oz. glue, cement covering, full size scale drawing, and all parts.
Construction Set complete, postpaid..... $4.95

Note: In issuing money orders, use St. George, N. Y., postoffice

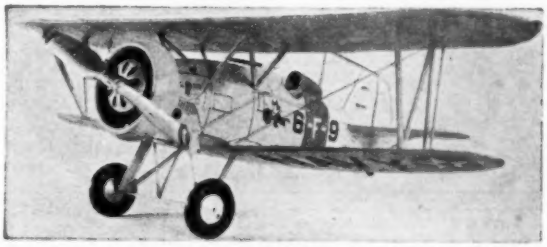
NEW LOCKHEED P23A NAVY FIGHTER



COMBINATION LAND AND SEA PLANE SET
32" Span. Length 20½". Weight 3½ oz. ¾" Scale

New 4-gun Navy fighter. Model will rise from land or water in few feet. Construction set contains fuselage and pontoon formers, wing ribs, tips, etc., printed on balsa, a 3⅜" turned cowl front, 2 instrument boards, colored insignia, lettering, windshields, 9" carved scale flying prop shown, 3 oz. silver paint, 1 oz. cement, ½ oz. black, 2 oz. glue, ready cut wheel pants, strong 2" aluminum wheels, 12 feet of rubber, and large 33"x44" drawing of land and sea plane. This is a sensational model and only one of its type in the world.
Construction Set in labeled gift box, postpaid..... $2.95

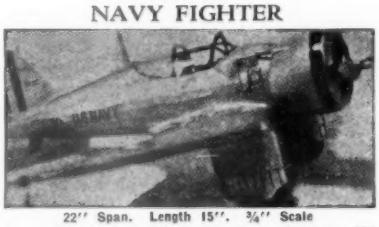
NEW BOEING F4B4 NAVY FIGHTER



22½" Span. Length 14½". Weight 2½ oz. Color, Grey, etc.

This is the finest equipped Boeing, F4B4 model in the world. New improved model exclusively equipped with new 3¼" special aluminum streamline tapered cowl ring, 9 cylinder celluloid motor with aluminum ventilator front, 8" carved varnished steel type propeller, printed out balsa wood parts, 2 oz. grey dope, ½ oz. yellow, ½ oz. red, paper cement, glue, formed wire parts, celluloid wheels, tail wheel, U. S. Navy lettering, colored insignia, and ¾" scale drawing. **Construction Set complete, postpaid $2.95**

NORTHROP FT1 NAVY FIGHTER



22" Span. Length 15". ¾" Scale

A beautiful flying model of the latest Northrop 280 m.p.h. fighter. Set contains 3" turned motor front, 8" carved propeller, insignia, silver, black and clear dope, glue, all parts printed on balsa, full scale drawing, and all parts to build as shown.
Construction Set complete, postpaid..... $2.00

BOEING P26A ARMY PURSUIT

22" Span. Length 17½". ¾" Scale

150 of this fast pursuit plane are now in use in the U. S. Army. Construction set has 3" celluloid motor, 3¼" tapered aluminum cowl, 8" steel type prop, set of colored paints, glue, etc., insignia, drawing, printed parts.
Construction Set complete, postpaid..... $2.75

LOCKHEED ELECTRA R-20-1

27½" Span. Length 17". ½" Scale

Set has all parts printed on balsa, turned motor fronts, carved steel type props, set of 3 colored paints, glue, etc., balsa wheels, concealed motor unit through fuselage. Scale drawing.
Construction Set complete, postpaid..... $2.95

NORTHROP A17 ARMY ATTACK

24" Span. Length 17". ½" Scale

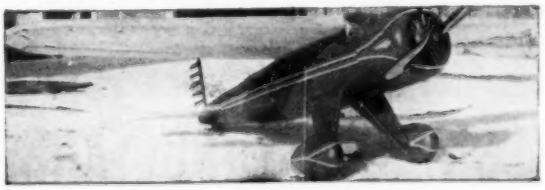
Exact scale model of one of the 125 new attack Northrops just ordered by the U. S. Army. Set has 2½" turned motor front, 7" steel type prop, insignias, set of colored liquids, glue, etc., all parts printed on balsa, full size scale drawing, and all parts.
Construction Set complete, postpaid..... $2.50

NEW 1937 CATALOG

Large 7"x9" illustrated catalog showing large photos of the latest models, motors, parts, etc.
Send 10c coin.

2 NEW LOCKHEED ARMY VEGA GAS MODELS

51" Span Set
$8.50
F.O.B. N.Y.



82" Span Set
$17.50
F.O.B. N.Y.

51" Span. Length 35". Weight without motor 20 oz.

This new gas model is very strong and specially designed to use the 1/10 h.p. BRAT or ELF gas motors. A very convenient size model. All body formers, ribs, etc., are ready cut to shape. Full set of colored dopes, glue, etc., turned motor front, ready cut pants, balsa wheels, and full size scale drawing. Set, F.O.B. N.Y..... **$8.50**

82" Span. Dry set without liquids, but includes glue, all parts ready cut to size, turned motor front, balsa wheels, silk covering, 2" scale full size drawing. Set, F.O.B. N. Y..... **$17.50**

Note: Orders sent West of Miss. or Foreign, add 20c postage

California Dealer: JAYS MODEL AIRCRAFT, 7763 Melrose Ave., Hollywood, California

MINIATURE AIRCRAFT CORP., 83 Low Terrace, New Brighton, New York

Altitude Test

(*Continued from page 25*)

The army faces similar problems, for military operation in the substratosphere is thought to offer advantages for certain missions.

At Wright Field a new altitude chamber has just been installed, it was announced recently by Brig. Gen. A. W. Robins, chief of the material division of the air corps. The chamber is simply one piece of equipment in the new physiological research laboratory.

In the earliest days of flying such a laboratory was not necessary. A quarter-century ago, the world altitude record was but 16,000 feet, at which level oxygen is not needed. During the war, altitude flying became imperative to avoid anti-aircraft fire. A medical research laboratory was established on Long Island, principally to study oxygen problems.

In 1920 the laboratory was discontinued, all energy being turned to aircraft development. But by 1931 speeds, altitudes and other flying conditions were stepped up to the point where more attention had to be given the flyer himself.

The altitude chamber contains three compartments, one six feet long bisecting identical compartments each 12 feet long. The end compartments may be used for independent experiments, and in them men and animals may "fly" at various levels so that such effects as those described by Dr. Armstrong may be studied.

This chamber is much the same as the decompression chambers used aboard ships that carry deep-sea divers. In these chambers practically any degree of pressure can be obtained, thereby preventing "the bends", or extreme results in sudden changing of pressure that has fatally injured many men who have not been able to be "decompressed" after diving.

In one of the end compartments is a tubular chamber large enough for a man to crawl into in which conditions of a supercharged pressure cabin will be simulated while the air surrounding the small chamber is rare, cold and lacking oxygen, like the atmosphere at high altitude.

Telephones in the compartments make it possible for anyone under test to converse with persons outside, describing reactions.

END

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Building the B/J

(*Continued from page 44*)

¼-inch at the trailing edge. After the struts have been inserted the wiring diagram is explained on the plan and should be installed in the frame work before covering the model.

COVERING THE MODEL

The entire model is covered with a good grade of bamboo paper. In applying the paper to the frame work, ordinary model airplane dope will not do the trick. Ordinary cement thinned out slightly, makes an excellent paper cement. In order to obtain a nice covering job, see that practically all wrinkles are removed.

Do not stretch the paper so tightly over frame that it will have a tendency to pull it out of shape. After the various parts have been covered, dope with water. This will cause paper to tighten over framework. If the brush is used, extra precautions should be taken so as not to tear the paper.

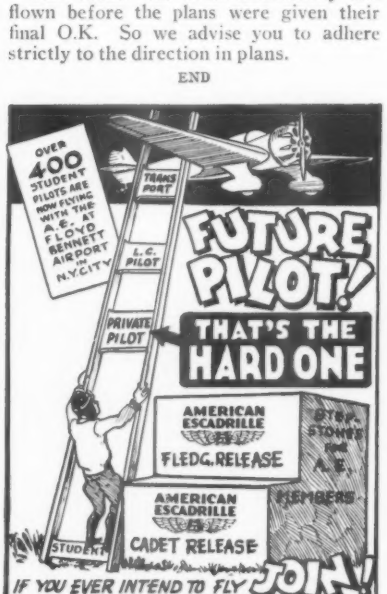
Any small spraying device is an excellent means of applying the water. After the pieces have become thoroughly dry, clear dope them. To obtain a smooth finish, a light sanding is given between each coat. To finish off model, color coats are applied.

ASSEMBLING

Extra precautions are required in assembling the model as proper alignment of pieces must be obtained in order that the model will fly properly. Please bear in mind, a little thought and study at this point will save many hours of additional labor in repairing your model.

This model has been successfully test flown before the plans were given their final O.K. So we advise you to adhere strictly to the direction in plans.

END



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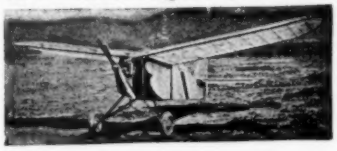

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G.H.Q. SCORES AGAIN!

Modern Mechanix contained the following editorial in its April issue

Gasoline powered airplane models are finding great favor with aviation fans and a $3 prize was awarded to Francis Kosanda, of Hopkins, Minn., for his interesting letter:

Francis Kosanda, of Hopkins, Minn., holds gasoline powered model he and Robert Apgar constructed. On its initial flight, the 9-foot model flew out of sight but was recovered again.

Hopkins, Minn.

Dear Editor:

Enclosed is a photo of a gas powered model airplane built by Robert Apgar, of Minneapolis, and myself. It is of original design and powered with a G.H.Q. motor.

The model weighs five and one-half pounds, has a wing span of nine feet, and an aspect ratio of 8-1. On a test flight the model went out of sight after ten minutes, but was later recovered from a tree overhanging the Mississippi River.

Your articles on gas engines, gas models, and model airplanes are excellent. Francis Kosanda.

Judging from the report, the gas model must be an excellent cloud chaser and we are glad it was recovered without serious damage.

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Reminiscent

(*Continued from page 22*)

well as the *New York Times* to do a piece on Mr. Wright as the 30th anniversary of his Kitty Hawk flight rolled around. In company with "Cub" Taylor, of the *New York Daily News*, brother of "Swanee" Taylor whom you all know well, we had a grand interview with Mr. Wright. I know it explodes a journalistic legend that he is one of the ranking "hard ones" to interview, and I'm glad to do it.

Back in the days of Curtiss field when Colonel Lindbergh was going in and out of that airport, it was the consensus of opinion among newspapermen that he was the "hardest case" of them all. Aside from watching his movements carefully as they came within my particular orders, I, like the others, soon lost interest in getting Lindy to say anything.

The mourned Wiley Post was difficult to interview but in another way. I believe he was truly modest. I don't think he liked being asked all the questions a reporter can think up and he was inclined to show it. But he bore up under his ordeal in a way that kept him from being any kind of a *bete noire* to the newsmen. He constitutes my personal nomination for the pluckiest member of the flying gentry I ever met.

So you can see, after these few paragraphs, where the aviation reporter gets his enthusiasms, his dislikes and his delights.

Aviation reporting, it might be said here, is generally divisible into two phases: reporting of the activities of the topflight personalities and reporting technical developments. Toughest technical assignment I ever had was getting Capt. Frank Klein's story of his pioneer work in developing high-octane fuel. Frank is a true technician; he knows his subject from Alpha to Omega but has a hard time making a simple reporter understand what it is all about.

My own work, of which numerous examples have (I'm glad to say) appeared in POPULAR AVIATION, has been largely on the side of personalities of the field. I'll admit that coming into a port *a la* fishtail and being handed the stick by some brave guy who trusts my nonprofessional judgment constitute some of the more exciting chapters in my pursuit of the ever-elusive news story. I'll admit, too, that fishtailing a ship to the ground still makes me suck in my breath and try to think of everything but the business at hand.

Thus, as a corollary proposition, I'll have to admit that the personalities of aviation and reporting their activities absorb me far more than the technical side. One is naturally tremendously interested in the technical progress of flying and I am no exception. But it's the study of the human side of it that really captures my imagination.

What do these topflighters talk about? I'll admit that I have a satchel full of notes in my cramped handwriting recording remarks and discourses of some of them:

Maj. Gen. Benjamin ("Benny") D. Foulois once said: "Many people call me 'Benny'. I like it. I also get a big kick out of being called 'Lieutenant' by men who remember me that far back". Comm. Jacob ("Jake") Klein, the "Los Angeles'" skipper, told me: "The Germans are the most thorough builders of lighter-than-air craft in the world . . . once I used to chase spies as an intelligence officer . . . I took to dirigibles for adventure and excitement—and got it".

Juan de la Cierva, a few months before his tragic death, said: "The future of the autogiro does not limit the imagination. . . . I think if we keep on with our experimental rather than sales-promotion work, we will come out ahead". Col. Robert L. Rockwell, Lafayette Escadrille commander, told me: "Landing a flaming ship on my first cross-country is one thing I'll never forget, believe me".

Those two Bad Boy Berts of aviation, Acosta and Hall, or *enfants terribles* as Hall would probably put it, were unusually pithy in commenting. Said Acosta: "Reporters make a hell of a mountain out of some of my stunts. I know more about what I'm doing than I get credit for". Said Hall: "Hell, no, I'm not through with flying. And why should I be?"

Which was somewhat the tenor of remarks made to me on a hot day in Chicago by Brig. Gen. Henry C. Pratt: "Why should I retire when I revert in rank? There's plenty of opportunity ahead. Maybe there'll be a B.G. in the service for me again. I'll take the chance". Brig. Gen. A. W. Robins said: "These 'theoretical' bombing raids over large cities should be a great object lesson to the people. It should teach them the need for adequate air defense."

Maj. Gen. James E. Fechet remarked:

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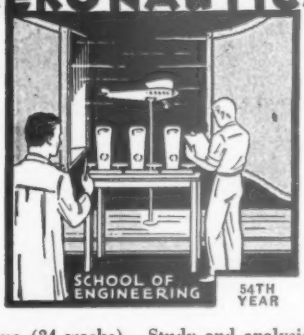

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"I would certainly encourage young men to learn the art of flying". The immortal "Billy" Mitchell said testily: "These congressmen will some day find out what it's all about. They're like most of the people, they haven't any idea what damage a powerful aerial attack could do right now against the United States". Maj. Gen. Oscar Westover, watching Orville Wright inspecting 1937 army aircraft, remarked: "It must give Mr. Wright a tremendous sensation to realize the part he played in making these things a reality".

Mr. Wright observed: "I'm afraid I must disillusion you. It is not true that the toy glider brought home by my father started us with our experiments. We really derived our inspiration and determination to go ahead through our studies of Otto Lilienthal".

Anthony H. G. Fokker told me: "I wanted to sell my planes to the British but they turned me down so I went after the other side". Maj. Alexander de Seversky related: "I sat there on the remains of my ship. It was pitch dark. I was bobbing up and down with every wave. I had a funny feeling in my leg. I ran my hand along it and found it was off". Eddie Rickenbacker said: "We're ahead of everyone else in aviation and the big job is to keep ahead".

Lord John Carberry, between moments of ogling the bright lights of New York, related some of his early war experiences: "We used to go up in pushers with shotguns and pistols and bricks, you know. I can't say I was very lucky getting the other fellow. I was lucky that he didn't get me". Sir Hubert Wilkins said: "Give me raw meat for my dinner. That's all I require. I think I'd become ill on cooked food". Gen. Italo Balbo remarked: "Il Duce is the most powerful and glamorous figure in the world today. Our flight to America I hope will advance the progress of aviation by ten years". (An interpreted interview.)

Col. Clarence Chamberlin told me: "I am considering a pretty good offer from the city (New York). I think Barren Island would make a good airport despite the objections of fog. We'll make fog flying as easy as anything one of these days". Maj. Albert W. Stevens said: "It takes months and months to prepare for a stratosphere flight and even then you are up against the weather and don't know how you'll come out. There can be do doubt, however, as to the practical scientific value of these flights".

And so it goes. Pilots think and talk flying. I suppose they're like newspapermen who like to believe that they are the greatest shop-talking fraternity in the world. I doubt that assumption, particularly after interviewing so many actors and pilots. I think these people can out-talk newspapermen any day in the week when they get started on "shop". It's open season on shop talk all year 'round with them.

There remain, however, scores piled on scores of other pilots who have achieved reputations in the profession. What these men have said in the quiet purlieus of airport pilots' sleeping quarters; over the table set with a bottle of ale and snacks; or in the hurdygurdy excitement of the "main event" in a "flying holiday" would cram a volume or two.

But whether he wears the two stars of a major general of the flying service or simply the helmet of the pilot not yet known to renown, he talks the same language and the same subjects. His opinions are not exactly standardized, but there remains a uniformity about them. After all, flying is flying and there's no farewell to wings even when the "little worms part your hair in the middle".

As an aviation reporter, I see most of this tableau from the parade review box as well as from backstage. It looks good to me either way. It's all pretty swell stuff. My first flight was in 1919. The sensations haven't changed much unless I admit that I scare easier—which I do.

Inasmuch as you'll recognize a number of these names, I might as well wind this piece up with a few personal nominations for the "most" this or the "most" that.

Most talkative: Charley Levine, first trans-Atlantic passenger. Most absent-minded: Maj. A. W. Stevens. Sveltest: Eddie Rickenbacker. Shyest: Lord John Carberry. Most modest: Capt. Albert F. Hegenberger, father of blind flying. Peppiest: "Benny" Foulois. Saltiest: "Jake" Klein. Handsomest (wait'll Roscoe reads this): Art Caperton. Most affable: R. Turner (There, now, Roscoe). Most glib: "Tommy" Tomlinson. Gayest: Amelia Earhart Putnam.

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Odor Motor

(Continued from page 26)

clock which blows a loud whistle at noon and 5 o'clock and at 1 p. m. on Saturdays. This reminds the pilot it is time to put on the "nose bag" or, possibly, of his date with someone else's wife. Furthermore, it also prevents his worrying about flying any more than he gets paid for.

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Two absolutely new inventions are to be found on the Odor Motor. The door (M) and the faucet (N). Neither of these, however, are in any way related to the Darwin or Einstein theories. When things seem to be going wrong the pilot merely takes a key out of his pocket, opens the door (M), looks inside and decides he knows nothing whatever about the motor.

Incidentally, this is where the graft and repair charges come in. As to the faucet (N), the pilot may carry a can of coal oil or nitro-glycerine, again open the door (M) and place it inside. There, mixed with oil and graphite and seasoned with aroma d'limburger, it forthwith becomes an amazing drink obtainable via the faucet (N).

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For further particulars on this marvelousy aero engine, the Messrs. Rankin and Beery request you to write directly to the Insulting Engineer, Ward 8, National Institution for the Feeble Minded and you will at once be supplied with this information together with the latest issue of Sears, Roebuck's catalogue.

END

Air Board

(Continued from page 38)

brought as close as possible to the Fair itself and if a little dredging and digging were done in Flushing Bay, just adjacent to the Fair site, a great deal could be done to popularize seaplanes and flying boats. In addition to the dredging, which was a governmental responsibility, a few minor expenditures would give splendid results.

A simple float might suffice, of the turn table type, just as used in the East River. Flushing Bay has five or six feet of water at high tide and about three feet of water at low tide. An experienced operator could pilot perfectly well even in three or four feet of water. At a pinch, he could plow right through the mud which was very soft and liquid.

A SHUTTLE SERVICE

Mr. Cook made the suggestion, which was enthusiastically taken up that a shuttle service might well be established from the East River to the Fair, or from Newark Airport and Floyd Bennett Field to the Fair, or from all three centers. There was once such a shuttle service in existence in New York City, but it faded away. Perhaps one of the derivatives of the Fair would be the reestablishment of the flying shuttle.

Residents of Westchester who wish to go to Boston find it somewhat of a hardship to have to go to Newark Airport before starting on a trip up north. In general, the concensus of opinion was that every emphasis should be made to bring water flying to the Fair, whether at North Beach, whether by dredging Flushing Bay or by shuttle service, and that the best method or methods should be studied in detail.

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meetings held from time to time during the progress of the Exposition. The aviation Museum at Dearborn and other museums would certainly cooperate.

DIFFICULTIES FOR THE INDUSTRY

When the discussion of the actual exhibit was initiated, Captain Depew brought up in fine fashion the viewpoint of the industry. It is already a hardship and considerable expense for the aircraft manufacturers or operators to participate in a ten day aircraft show. The expense of exhibiting for many months and of explaining ships and other aviation matters to millions of people would be a terrific drag on the industry.

Bringing the DC 4 airliner and the Boeing flying boat and to keep it for a year at the World's Fair, would be something like tying up the *Queen Mary* for a year at a marine exposition.

OTHER VIEWPOINTS

Messrs. Brooks, Young, Wilford, Chambers, Quick and Fleming all participated usefully in the discussion. Perhaps the following gives a faithful summary of their views:

1. The Fair should not be just an aircraft show. There should be a great deal of institutional advertising telling the people of the United States what aviation is today and what it will be tomorrow.
2. A real attempt should be made to show the public what a tremendous method of transportation was now available. Moving exhibits, maps, flash lamps visualizing of air transport schedules, with but few technicalities, would be a great help.
3. Exhibit should include honest, reliable and striking statistical data. If the exact truth regarding flying safety were given out, there would be nothing to be ashamed of and much would be done to establish confidence.
4. Young people should be given an opportunity to learn by working models, small wind tunnels, etc., how an airplane really flies, and the simple principles of aerodynamics.

DRAMATIZATION

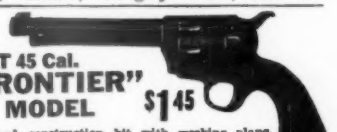
The Chairman set forth as his own personal view that considerable attention should be paid to dramatization and showmanship at the Fair. The Fair should be a combination of a national aircraft show, Coney Island, Langley Field, and the imaginative novels of Jules Verne and H. G. Wells.

Mr. Chambers was very strongly of the opinion that scientific showmanship was necessary. Mr. Swanee Taylor made the suggestion that not only should ships be shown, and actual process of construction during the Fair, but it would be a great stunt, if at all possible, to build a ship at the Fair and then fly it off from the grounds.

Of course, Mr. Taylor's suggestion smacks of good showmanship but there immediately rises the question as to the advisability or safety of such a stunt. Such a stunt, if it failed, would detract immeasurably from any standing aviation in general might have at the Fair. Besides, any conventional airplane, to be on safety's side, must be carefully test-flown before such a flight could be attempted. To attempt to test-fly a newly constructed airplane off grounds like those of the New York Fair would seem to be unwise in view of the large number of people that would be in the vicinity. A forced landing at a conventional airport would be a mere incident.

CONCLUSION

The definite conclusion was reached that amplification of the discussion would justify a letter to Mr. Grover Whalen; that every possible pressure should be brought on Mayor LaGuardia and the Federal authorities to stimulate water flying; and that every effort should be made to make the Fair a medium of national education in aviation and not just an industrial show. END



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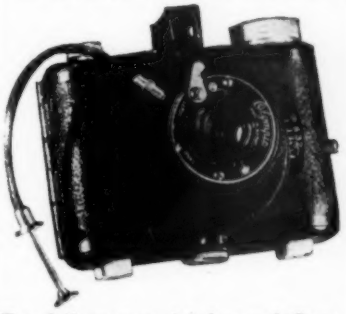

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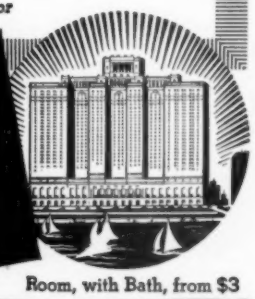

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Movie Stunts

(*Continued from page 20*)

This had never happened before in any of Dick Grace's other crashes.

The heavy motor of the ship had buried itself a foot and a half in the earth! When Dick Grace collapsed a second time, two days later, he was sent to the hospital for examination. There the doctors discovered that he had a broken neck! Luckily he recovered after lying in a cast for several months—Lady Fortune was still with him.

While in the hospital, Dick Grace had a good deal of time to think. He reviewed the past and the future. Slowly various points made themselves clearer. One of these was his health. In recent crashes he had noticed that broken bones had taken longer to heal than formerly and his bruises remained longer. He was rapidly using up his physical assets, but each time he had been injured he had learned something. Through these injuries he would be able to prevent others.

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And now he had a reputation as the foremost stunt flier in the movies. Work was not hard to find, he was able to take his choice of crashes now. His future lay ahead . . . he would continue to crash planes for the movie studios. Dick Grace is still at his work . . . his reputation is even greater than when he made his decision.

Al Wilson had an odd accident while flying in "Hell's Angels". He had just finished flying in a combat sequence and was returning with twenty other planes, from location . . . over the ocean near Redondo. Wilson throttled down his motor and flew lazily along in his Fokker biplane, resting after a strenuous afternoon's work.

Suddenly he was awakened from his reverie by an explosion in the front of his ship! Before he could guess at what had happened, the motor of his plane ran wild. He cut the motor and leaned over the side of his cockpit to examine the nose of the Fokker. The propeller was gone! No wonder the motor had raced so.

He felt the machine nose down and had trouble keeping it under control. It was impossible to land for according to Wilson's reckoning he was over the Hollywood Mountains. So he took the only other course left to take, he bailed out, and his parachute shot open above him. However, it seems that Wilson was mistaken as to his location, for instead of being over the Hollywood Mountains he was directly over the densely populated residential section of Hollywood.

Diving past him the Fokker sped earthward completely out of control. It ended its flight with a terrific crash in the backyard of Joseph M. Schenk's palatial home. His propeller fell upon a sidewalk, narrowly missing several pedestrians, and Al, himself, landed upon a nearby roof.

"Hell's Angels" was produced, in 1927, by Howard Hughes, who is now breaking all speed records with his famous low-wing racing planes. There were more accidents during the filming of this picture than in any of the other aviation pictures. This was mainly due to the fact that severe flying maneuvers were called for, and that this was a motion picture which had no faked flight shots. There were bound to be mishaps when fifty or more aircraft staged a dogfight in one small area of the sky.

This particular scene, containing fifty aircraft, had the largest number of aircraft ever to take part in any movie scene. Six months were spent in practice and training before the scene was attempted with all fifty planes. Despite this extensive training, during the final filming there were many narrow escapes and several accidents. In this scene there was one particular bit of action which wasn't in the script.

A German Fokker D-7, piloted by Ira Reed, at 5,000 feet altitude had just shot down an Allied plane and was looking about for another victim. Below his left wing, Reed sighted his prey. It was Stuart Murphy in a British S.E.-5 scout. Reed, in the German ship, banked and fired a short burst at the British scout. Reed passed the British plane so closely that he caught a glimpse of the features of Murphy's helmeted head, as he swooped by.

The German plane zoomed upward and fired a second burst. Murphy circled and the two machines roared directly at each other. At the last sec-

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ond, the German Fokker raised its nose heavenward as the British scout sped by beneath. The left wheel of the Fokker was spinning after lightly skimming the upper wing of the British machine—that was a close one! The two machines warily circled each other.

Murphy, in the British ship, was slightly higher than the Fokker. His blunt nosed scout dropped earthward as it dived upon the Fokker. They were going to crash! The tips of their wings seemed barely to touch for a slim split second; the two machines separated.

The British scout's upper wing fluttered slightly and floated away. Murphy took one look, and bailed out, over the side of the flying wreckage, just as the lower left wing crumpled under the terrific pressure. He landed safely, but the remains of his plane were reduced to matchwood when it hit the earth at a tremendous speed.

The sudden shock stunned Reed for a moment, but he recovered quickly and debated as to whether he should take to his parachute. He peered upward to determine the full extent of the damage to his Fokker. Both right wings were almost torn from the German plane, and the right aileron was completely disabled . . . as he soon found out. Strips of fabric from the torn wings streamed and fluttered in the slipstream.

It would be very difficult to keep the Fokker in complete control without the use of the aileron; but nevertheless, Reed decided to try to save his ship. In a shallow dive the crippled Fokker neared the ground. Cutting the powerful Mercedes engine he glided earthwards. His glide became very flat as he stalled in, and dropped toward a farmer's field which lay just ahead of him. The Fokker's wheels touched the ground and the machine bounced four or five times as it dragged heavily in the soft earth and came to a standstill. Reed had saved his ship!

And then, just when "Hell's Angels" was completed, there came the tragedy of the Gotha bomber. This was a post-war Sikorsky biplane which had been reconstructed to appear as a wartime German Gotha. The addition of false construction and the removal of parts of the original Sikorsky did not make the finished product a very strong machine.

The Gotha was to appear in a scene of a combat between itself and several Fokker D-7s during which it was to be shot down in flames. It was to catch afire and in addition go into a 2,000 foot dive. A mechanic was to sit in the rear of the bomber's fuselage and set off smoke bombs, as the Gotha descended in its dive, to give the appearance of a burning plane. The pilot and mechanic were to be the only occupants of the bomber, both wearing parachutes.

The pilot for this job was a hard person to find, for the work of piloting the huge Gotha was not enviable. The studio finally hired a pilot for the work, for which he would receive $250.00. This pilot was an experienced flier and was no novice at flying . . . his name will not be mentioned for reasons which will be seen later.

The day of the filming arrived. The bomber trundled clumsily into the wind, took off, and gained altitude slowly. At 8,000 feet, among billowy clouds, it leveled off and the camera ships got into position. The pilot completed the first part of the combat scene with the Fokkers. Now was the time! He signaled to the mechanic, in the tail of the ship, to start setting off the smoke bombs. The control wheel moved forward and the nose of the cumbersome machine dropped swiftly toward the earth which lay a mile and a half below.

Diving for a few hundred feet everything went according to schedule. After the ship had dropped only about five hundred feet, instead of continuing its 2,000 foot dive, it started into a half-turn as though going into a spin. Something had gone wrong! Fighting the heavy controls the pilot tried desperately to bring the machine out of its spin before it was too late.

But it was already too late . . . the bomber was spinning, spinning faster and faster and the turns were growing ever narrowed. The wings shook and vibrated as though they would disintegrate; the scream of the wind and shrill high pitched shreik of the wires sounded above the tumultous thunder of the straining motors.

The pilot realized that there was no power on earth which could bring the unwieldy machine out of its tight spin. He turned in his cockpit, toward the rear of the plane, and shouted to the working mechanic, who was unaware of the danger, "Jump! The ship's going to pieces!" His voice barely resounded above the roaring wind and thundering motors. The pilot tried to rise in his forward cockpit but was thrown back by the great pressure of the roaring wind. His second try was successful; he jumped

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and hurtled past the tail of the Gotha and his chute strung out above him.

Swinging below his parachute, the pilot anxiously watched the spinning Gotha, for the appearance of the mechanic. But the mechanic never appeared . . . he didn't jump! Evidently he had not heard the pilot's order above the deafening uproar of the diving bomber. The mechanic continued to set off the smoke bombs at regular intervals. He was still setting them off as the huge craft spun into the earth and burst into flames.

The pilot landed safely, but perhaps he wished that he too had died in the wreckage of the flaming bomber. No pilot is his friend, they will have nothing to do with him. He has never flown again in Hollywood, he is unwanted . . . a tragic victim of circumstance.

The band of old time stunt fliers has steadily decreased in number, until there are now only a few left. Very few of these men have retired; most have died in action. Dick Grace is still crashing planes for the movies; still talking of the crashes he is to do next year, and of the others he will do the following year. He is the living memorial of those old time stunt pilots, they were of the same materials as he; made in the same mold, which is now broken.

The new school has come along. Pilots with the best of training and theoretical experience. They fly with scientific aids and mathematical precision. The old wartime crates, hung together with wire and hope, have given way to modern machines. The movie studios have even gone so far as to make reproductions of wartime aircraft, with modifications realized in only the most modern of aircraft. Perhaps the new school will live longer . . . let us hope so.

The next time you see an airplane dash itself against the earth, in a motion picture, think twice before you condemn the scene as "fake". Perhaps a man died for that scene . . . died for your entertainment.

END

To Our Readers

POPULAR PHOTOGRAPHY, new born sister of POPULAR AVIATION, is brimful of articles and pictures of direct interest to our air fans. Get a copy at your news stand, or better yet, send in $2.50 for a one year subscription.

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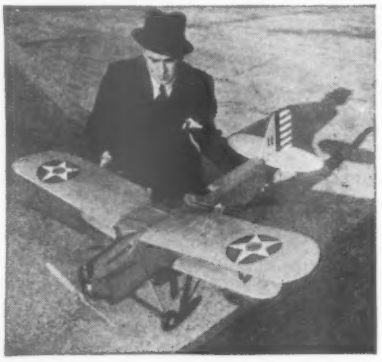

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WHY KEEP RESTRICTING AMATEURS?

(*Continued from page* 40)

Inspector Greenwood is a well known executive and skilled pilot. Board members serve without pay, except while on active duty. All expenses and salaries are paid from the special gasoline tax, so that the general tax payer is not out a cent. The whole layout is as nearly ideal as it could be. If expenses were paid out of the general fund there would always be the cry about taxes, but this is entirely done away with.

Aside from the actual control of amateur activities, the board has been doing much to foster aviation development. Through its enterprise this state is one of the few in the country that is completely airmarked. During the time government funds have been available for such work a large number of airports have been built, with active cooperation by the board. It was largely through the board's influence that Portland secured its great super-airport, which when completed, will have cost approximately $4,000,000 and be one of the finest airports in the world.

It is naturally the hope of all loyal Oregonians that every state in the Union will eventually use the "Oregon Plan." If it is practical here it is practical anywhere. If we can do it, so can the others. The first requirement is that all interested parties within a state form an active unit, under efficient control. Our organization here is the Private Flyers' Association, known simply as "PFA."

It is a sort of offspring of the old A.A.L., which many of you will recall as being originated by this magazine. Membership includes nearly every interested man and woman in the state, including many professionals. The membership dues are not high and members receive monthly copies of the official journal, "Flypaper," a breezy mimeographed magazine that is worth more than the cost of dues alone.

PFA operates smoothly and effectively. When something needs doing, PFA does it. Each year it puts on a series of air tours and air circuses that have been outstandingly successful. If oppressive laws threaten, PFA goes to the state capitol in a body and the threatening law goes into the waste basket right there.

Surely, in every state there can be found a half dozen men who are willing to go to the trouble and expense of organizing a group such as the PFA. That MUST be done before any headway can be made. There are no serious organization problems to be worked out, as that has been done here. To those seriously interested it may be said that a stamped envelope sent to: PFA, Eugene, Oregon, will bring details and a copy of Flypaper. Copies of the actual law and regulations code may be obtained from the State Board of Aeronautics, Lumbermen's Bldg., Portland, Oregon

If this country is to have any sort of amateur aviation at all something must be done quickly, and every passing month makes the task that much more difficult. The goal is one that is worth working for and there is not a state in the Union that would not be better off with a law such as ours.

Every branch of flying would be bettered, more flying schools, more and better airports, more and better pilots in time of need, more public confidence and better feelings all around. No nation can grow by stifling its arts and sciences and the best way you can serve your country right now is to work for liberal, state-controlled flying laws.

If this laxity is allowed to continue there is no question that America's amateur aviation is going to suffer serious injury that only time will be able to heal. Neither Orville nor Wilbur Wright were licensed by either Federal or state "authorities". Yet it was they who launched that flimsy glider at Kitty Hawk.

Every person interested in aeronautics is, at the beginning, an amateur. How "professional" these amateurs become usually depends entirely upon themselves. Either they succeed or they don't and no license in the world could change that situation. END

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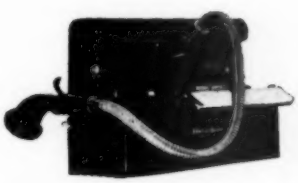

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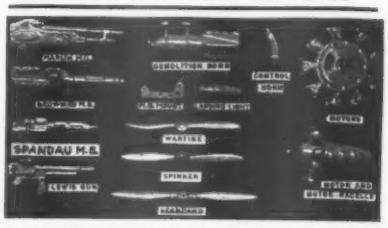

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Young Airman

(*Continued from page 42*)

"Bull Pup" to a Lockheed Vega. Very angry she was, when a polite attendant led her firmly away.

Fantastic as it may sound, I really believe that the growth in the model airplane industry (aside from their educative values and marked improvements) is due to the fact that so many young people can't be around actual airplanes. It acts as an emotional release.

A few years ago you would find every kid that was interested in flying at some pasture where they were greasing rocker-arms, oiling valves, cleaning motors or giving the Canucks of a wandering circus a bath.

Perhaps they were gypped out of their hard earned flying time. Perhaps the too-busy pilot was unable to give them a hop. Yet they did collect time or rides that they wouldn't have secured in any other way.

Better still, they were smelling hot oil, doped fabric, and high test gasoline. Then that never-to-be-forgotten thrill when the kid was permitted to warm up the OX or Hisso or hold a wing tip as the pilot blasted the ship around.

Those days, if not gone, are fast passing. We can't bring them back and it would not be desirable to do so even if we could. But some steps must be taken to give the young people a break. They are not the only ones who lose but the industry as well. How much good material is going to waste that might be turned in to first class flyers, mechanics, engineers, designers, or instructors.

The government has done so much in contributing to various projects that the public is getting too much in the habit of passing the buck to Uncle Sam. Uncle Sam provides the means if we would but take advantage of them. What we need is a strong aeronautical association that is all-inclusive of those whose interest is centered in aviation.

END

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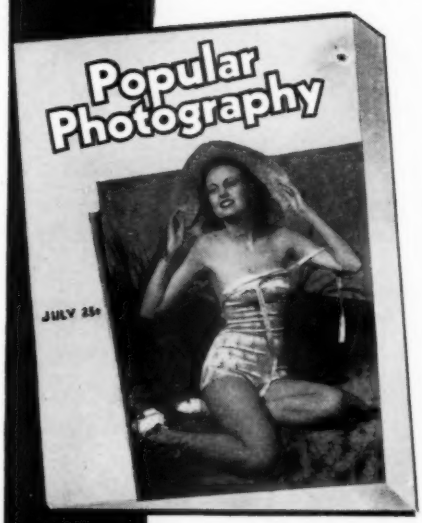

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